

DEPARTMENT OF AGRICULTURE

CENTRAL EXPERIMENTAL FARM

OTTAWA, CANADA

BACON PIGS IN CANADA

NOTES ON BREEDING, FEEDING AND MANAGING SWINE
WITH REPORTS OF SOME EXPERIMENTS

BY

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To the Honourable

The Minister of Agriculture.

SIR,—I herewith submit for your approval Bulletin 51 of the Experimental Farm series on the 'Breeding, Feeding, Managing and Housing of Bacon Pigs in Canada' prepared under my direction by Mr. J. H. Grisdale, Agriculturist of the Central Experimental Farm.

The swine industry has developed very rapidly in Canada during the past few years, and the facilities which the country affords for the extension of this profitable branch of farming are practically unlimited.

In this bulletin much information is given regarding the selection of the best types of animals for carrying on this work and different methods of management as to housing, pasturing, &c. Many facts are also presented in reference to the care and treatment of the animals of different ages, and the results of many experiments are given, which have been planned to gain information as to the most profitable methods of feeding swine in the different stages of their growth.

A summary is also presented of the experiments which have been conducted in reference to pork production since the beginning of this work at the experimental farm.

It is hoped that the information given in this bulletin will prove useful to the farmers of Canada, and aid in still further advancing this important industry throughout the Dominion.

I have the honour to be,

Your obedient servant,

WM. SAUNDERS,
Director of Experimental Farms.

OTTAWA, June 28, 1905.

PART I.—SOME NOTES ON BREEDING, FEEDING, MANAGING AND HOUSING BACON PIGS IN CANADA.

Geographical position, climatic conditions and foreign market requirements unite to lend an evergrowing importance to the Canadian bacon producing industry. The various problems confronting the farmers who engage in this industry have received at the different Dominion Experimental Farms close attention during the last fifteen years. Some of the information gained is given below and thereto is added a compilation of the results of a number of experiments conducted at Ottawa as well as the results of some work at Nappan, Brandon and Indian Head Farms.

Pigs were introduced upon the Central Experimental Farm in 1890. The breeds invested in were: Berkshires, Improved Large Yorkshires and Essex. Since that time Chester Whites, Poland Chinas, Tamworths and Large Blacks have been added and tested for different periods. The only breeds now kept are Improved Large Yorkshires, Tamworths and Berkshires.

Canadian packers demand pigs of a type suitable for the production of Wiltshire sides. Poland Chinas, Duroc Jerseys, Essex, Large Blacks and in a lesser degree Chester Whites have been found faulty in this respect.

The chief objection offered against these breeds has been the too great proportion of short sided, heavy shouldered, thick fat pigs found among them. Pigs possessing any one of the above peculiarities are not considered suitable for the manufacture of first-class bacon. Pigs having all these characteristics are quite impossible of conversion into prime Wiltshire sides.

THE BACON PIG.

A BRIEF DESCRIPTION.

Bacon hogs ready for the market should possess long deep bodies with straight or slightly arching top and straight underlines.

The shoulders should be fairly upright, joined closely to the body and rounded nicely over the top from side to side. The bodies should not, however, be any thicker through the shoulders at points more than half way up from the underline to the top line than through points at a similar height situated between the shoulder and the ham.

The croup should slope but slightly from the loin to the root of the tail. It should be of good length and should maintain its width throughout, which width should be the same as that of the body and shoulders.

In short, a straight-edge laid against the side from the shoulder point to the tail should touch at every point.

The ribs should spring out well from the spinal column but should fall in fairly vertical lines once their greatest curvature is attained, thus making a deep bodied rather than a round bodied animal.

The body should be carried on good stout, clean, straight-boned legs, free from cakiness at the pasterns and with square set hocks.

The feet should be strong and compact, the animal standing right up on his toes.

The neck should be of medium thickness with no tendency to coarseness.

The head should be clean cut and free from flabbiness at the jaw.

SUITABLE BREEDS.

As already suggested, pigs most nearly conforming to these requirements are found in greatest numbers among Large Improved Yorkshires, Tamworths and Berkshires, and among their grades and cross breeds.

By 'grade' is meant an animal the product of a pure bred sire, that is a sire registered or eligible for registration in some generally recognized herd book, and from a dam not so registered nor eligible for registration, whether she have none or many crosses of pure bred blood. By 'cross bred' is meant an animal the product of a pure bred sire and from a pure bred dam, the dam being, however, of a different breed from the sire.

Some of the more striking peculiarities of these different breeds of pigs suitable for bacon production are given below. These statements are made after several years experience of a varied character with each sort.

LARGE IMPROVED YORKSHIRES, white pigs, have been found to be a prolific and fairly early maturing breed. In shape they come very nearly being ideal bacon pigs. They furnish a very large proportion of carcasses answering the requirements of the best bacon trade. The hams are well developed and the proportion of fat to lean is usually about right.

The sows are docile, good milkers and very prolific. The boars are very impressive, seldom if ever failing to leave a strong impress on their progeny. They are usually robust healthy animals, but are not quite as well suited for pasturing as are pigs from some of the other breeds.

BERKSHIRES, black pigs with more or less white in the face and white points, have shown themselves to be not so prolific as some other breeds but to be very early maturing animals. Their admirers claim for them such a superiority in this respect and in their apparently superior powers to assimilate food as to more than make up for the rather small litters which are not infrequently borne. In conformation they are not quite so well suited for the bacon trade as are some of the other breeds. They are very well suited for pasturing, having few if any equals in this respect and giving very satisfactory returns indeed while being fed in this way. They are quite free from the affections of the skin and other troubles which quite often cause loss with white and red skinned sorts while on pasture.

TAMWORTHS, red pigs, have here shown themselves a quite prolific and fairly early maturing breed. They are almost invariably deep sided and long bodied, but are not infrequently rather light in the ham. They are fairly rapid growers, but are somewhat slower to come to maturity than are some other breeds. They cross well with Berkshires and with the Large Yorkshire. As sires they are fairly impressive.

BREEDING.

To enter into a long discussion of the various considerations that demand the attention of the breeder in his operations would require too great an amount of space for the present publication. The few remarks submitted are intended as a help to the beginner rather than a guide to the initiated.

THE BOAR.

Only pure bred boars of one of the above mentioned breeds should be used where it is desired to produce good bacon pigs. Pure bred sires are more impressive than grades or crosses, on account of having been bred for generations with certain aims in view. That is, pure bred boars are likely to leave litters in which every individual will closely resemble the sire in conformation, while the litters from grade or cross bred boars are likely to vary greatly in conformation.

The boar is half the herd, and where a pure bred boar is used on common or grade sows he is really of still greater importance than all the sows combined so far as conformation is concerned. It is evident therefore that very great care should be observed in the selection of a boar to head even a commonplace herd. All pure bred animals are not necessarily good animals. Many pedigreed pigs now in service should have been castrated in their early days. The very fact that they are pure bred, although inferior specimens, makes them even more dangerous than a common grade scrub, because being pure bred they are much more likely to leave their mark on their get. Have nothing to do therefore with the pure bred scrub.

The boar to be a good one should in the first place come from good stock. Boars of good conformation are sometimes found among the get of inferior breeding stock. Such boars are not likely to prove satisfactory no matter how nearly they may themselves approach the ideal in conformation and characteristics.

The ideal boar for breeding for bacon production will of course vary somewhat in conformation according to the breed in which he is sought. Generally speaking, however, he should be strongly masculine in appearance but not coarse. Masculinity indicates prepotency or impressiveness. It shows itself in various parts of the animal, more particularly in the head, neck and legs. The head should be of a good size, strong featured and broad between the eyes and ears. It should be attached to the body by a rather short, strong, somewhat crested neck. The hair should be somewhat coarser and the legs somewhat stronger than would be desired in a sow of similar size and the same age. Coarseness in boars is not infrequently mistaken for masculinity, particularly in this case when the coarseness shows itself strongly in the region of the shoulders. Broad heavy shouldered boars are not necessarily prepotent nor even extraordinarily vigorous sires. On the contrary not infrequently do they prove themselves lacking in vitality and impressiveness. The smooth shouldered, deep chested sire with large heart girth and well let down at the fore flank is much more likely to prove himself a valuable getter than the heavy shouldered fellow with the immense bristling crest so often regarded as the ideal sort.

He should be rather shorter bodied than the ideal bacon pig it is desired to breed and somewhat more compact in form. He should stand right up on the points of the toes of rather short, very strong, clean, straight, well placed legs. The hind quarters or hams and hind legs should be particularly well developed and free from signs of weakness. The croup should be broad, long and carried out fairly straight. Every muscle of the ham should stand well out right down to the hock, both inside and outside the gamine or second thigh. The hocks should be strong and squarely set, and the pasterns particularly well set and set.

The back should be long, level and straight, save for a slight tendency to arch at the loin. The body should be deep and strong looking.

The visible organs of re-production should be normal and well developed. No ruptured animals should ever be used for reproductive purposes.

In short the sire should be well balanced, or symmetrical, show lots of vitality and be masculine in his build and appearance.

THE SOW.

Every sow in the herd should be as good as can be procured. Having a good boar will not make up for inferior sows. Where it is not desired to sell stock for breeding purposes, however, the use of pure bred sows is not absolutely necessary to insure success.

It is generally supposed that the good brood sow should be somewhat more rangy, rather more loosely put together and a bit more open in conformation than the good boar of the same breed. Many compactly built sows, have, however, proven very excellent breeders, bearing and raising large, uniform and thrifty litters. It is very easy too to select sows so loose and ungainly as to be quite useless as mothers. In appearance the sow should be essentially feminine. She should have a strong but neat muz-

zle, broad forehead and large eyes set well apart, ears of medium thickness, firm, springy and covered with fine hair. The neck should be of medium length, fairly fine and should show no tendency to arch. The shoulders should be nicely rounded from side to side but a slight tendency to openness here is not so objectionable as in the case of the boar. The chest should be broad and deep and the heart girth very large. The back should be long, broad and arching toward and at the loin rather than straight. Good chest and hind flank are particularly important in the brood sow. They indicate strength and fertility or prolificacy. A good spring of rib and a deep body are also important as indicating fecundity and the likelihood of there being milk for the young when needed.



BREEDING CRATE FOR USE WHERE PIGS TO BE MATED ARE UNEQUAL IN SIZE OR WHERE SOWS ARE DIFFICULT TO SERVE.

The hams or hind quarters should be broad and well fleshed down to the hocks. The hocks should be wide apart but squarely set. This peculiarity together with a broad rump indicates ease in farrowing, which is a quite important consideration. The sow should stand on good, strong, clean boned, upright pasterned legs. Coarseness is not desired in bone or conformation, but any tendency toward what might be correctly described as fineness of bone cannot be too strongly condemned. It means sterility or small litters, weak pigs, and unprofitable operations.

No sow possessing less than twelve teats should ever be retained as a breeding animal. If she show fourteen or fifteen good teats starting well forward near the fore legs so much the better.

The teats should be evenly distributed and each should have a well defined udder for itself. A careful examination of teats should be made to see that all are milk giving and not blind, nor small secondary teats situated close to large useful ones.

Blind teats or teats having no opening will yield no milk, small or secondary teats situated close to good ones are very little better than blind teats.

In looking for animals conforming as nearly as possible to the above requirements no attention should be paid to individuals from small, uneven or badly nourished litters. Prolificacy or fecundity is hereditary, likewise the throwing of even litters and the power to yield a plenteous supply of milk for the nourishment of the young. Not infrequently good litters are spoiled because of the poor milking qualities of the mother. This quality of a good sow should receive much more attention than is usually given to it, and attention thereto in making the selection of the sow would most certainly be rewarded by the peculiar thrift and vigor of the litters from the good milking sows.

In conclusion let the sows selected be docile. An irritable nervous animal is sure to prove unsatisfactory for breeding purposes. Young pigs do not always betray this peculiarity even though they possess it in a high degree hence the character of the mother should be noted in this respect. Of course very much may be done by care and training or lack thereof to make or mar both sexes in this respect. Kindness in dealing with live stock of all kinds is necessary; in dealing with no class will it prove more profitable than when bestowed upon brood sows and boars.

STARTING A HERD.

To the would-be beginner not learned in hog lore nor wise by experience, one or two additional suggestions might be offered.

The first selection of sows should be made from a herd showing uniformity of type, provided, of course, such type fairly closely approaches the ideal. It is much less difficult to judge of the probable value of a pig for breeding purposes at nine months old or older than it is at any earlier age. Hence the safer and quite probably the more economical plan for the beginner would be to purchase young sows safe in young. In addition to the points already discussed on preceding pages the buyer should see that the sows were well grown for their age and closely resembled each other in characteristics and conformation. If establishing a pure bred herd is aimed at it will be found that no other distinguishing peculiarity will be of so great value and such a valuable advertisement as uniformity of type in the whole herd. The stock boar or boars need not, and in fact, had better not be purchased at the same time as the sows. A study of the sows and their litters for a few months having in mind the sire or sires of the various litters will prove a wonderful help toward the selection of a good animal to head the herd. He should be chosen in conformity with the type described above but any weakness of the sows should be kept in mind, and a boar particularly good where the sows are weak will be found of value in correcting these faults otherwise likely to be transmitted to the offspring. Occasionally where no serious faults are in evidence and where it is particularly desired to fix more firmly some good quality or establish a type, pigs fairly near akin may be mated. It is unsafe, however, to make more than one cross with closely related sires and generally speaking animals less than three generations apart should not be mated.

CARE AND MANAGEMENT.

BREEDING.

The sow should give her first litter when about a year old. If bred to farrow at an earlier age, she is not likely to raise such a good litter; if allowed to go much over that age she is adding to the cost of production quite unnecessarily. First litter pigs are supposed to be inferior to pigs from subsequent litters but our experience here does not appear to support this idea. It will of course be necessary to have no more pigs on the sow than she can properly nourish, and to feed her exceedingly well while suckling the young.

It is usually better to allow somewhat more than six months between the first and second litter. For that reason, if it is possible to keep the sow in fair condition the first litter had better be allowed to run with her for three months or longer. In this way she will be prevented from coming into heat. Sows if allowed to come into heat once or twice without being served are very frequently quite difficult to get safe in young when it is finally decided to breed them. Sows giving only one litter a year are usually unsatisfactory breeders for the above reason, and although fall litters may not be so profitable as spring litters, the breeder anxious to have his spring litters at a certain time, or desirous of making the most money possible out of his feeding operations would most likely find it more satisfactory and profitable in the long run to have two litters in the year.

FEEDING.

Before being bred and during the early weeks of pregnancy a succulent ration, pasture in summer and roots in winter, will be found the most satisfactory and economical. Rape, clover, blue grass, brome, alfalfa, vetches or pease and oats all make excellent pasturage, and but a small amount of meal will be required in addition until the sow is ten or twelve weeks gone in young when the addition of a small amount of chopped oats or barley, bran, shorts or whole pease will be advisable. In winter, pasture may be replaced to a large extent by roots, &c., as sugar beets, mangels, turnips, kohl rabi, cabbage, carrots, ensilage, clover or alfalfa hay dry or steamed. The chief considerations are to keep the sow in good flesh by means of flesh forming rather than fat forming foods to let her have lots of exercise and to keep her digestive organs in nice condition. Keep the sow in good flesh, half starved breeding sows are certain to give inferior young, but by all means avoid getting them too fat. Over fat sows are likely to have small weakly litters.

FARROWING TIME.

For a week or ten days before farrowing or parturition which should occur about 112 days after service, the sow should receive a rather more liberal ration of milk producing food such as bran mashes, chopped oats, skim milk, shorts, a little oil meal, &c., being careful always to see that there are no signs of constipation, that the bowels are quite loose.

The attendant should always be on good terms with every sow, but this should very particularly be the case for a few weeks before, during the time of, and for a few weeks after parturition. By a little petting and a few kindnesses that appeal to her sense of what is nice the attendant can win the confidence of almost any sow, provided of course, that he has not previously won her dislike.

Parturition should take place in a pen specially prepared for the event and for the accommodation of the mother and her new family during the first few weeks of their lives. Only a small amount of cut straw or chaff should be given for bedding, thus no opportunity being offered the little ones to get lost or tangled up and so exposed to danger of death from cold, hunger or crushing by the sow. As a further protection, a board, about 8 inches wide placed flat horizontally about 8 inches from the floor along the wall to which it should be firmly attached will be found of considerable value, affording a space where the little ones can run or be shoved when the mother lies down.

Generally speaking, the less interference at parturition the better. If the weather be cold, a good plan is to have some clean dry straw in a box or barrel into which the little ones may be placed as they are born being first dried with a cloth. If parturition is slow in cold weather it is sometimes wise to put some warm bricks or flat stones in the box with the youngsters. They should be allowed to suck as soon as possible after birth.

Shortly after birth any sharp teeth in the mouths of the young ones should be broken out by means of a pair of small pinchers. This will usually be found to help materially in smoothing out little family difficulties.

The sow will not likely show any desire for food within 24 hours after farrowing; but should she show any disposition to eat, a warm thin mash or gruel of bran, shorts or oatmeal may be given. No cold drinks should be allowed within the 24 hours, but frequently small amounts of warm water may be given. Her ration as soon as she is in good shape to utilize the food should consist of bran, shorts, ground oats and barley, pease, oil meal, skim milk, &c., and some roots or green feed. She will require a very heavy and very nutritious ration after the second week, but the closest attention must be paid to the young to see that the milk is agreeing with them. Any signs of scours or constipation should be the signal for a change in the feed of the sow. The character of the food eaten by the sow seems to influence the quality of the milk she produces and so affect the digestive organs of the little ones. The health of the litter is an accurate gauge of the healthfulness of the dam, and *vice versa*. It is of course possible to feed so as to cause the sow to produce too much milk and so make the piglings too fat. This condition not infrequently shows itself in what is known as 'thumps,' a disease nearly always fatal.

WEANING.

The little ones should be encouraged to eat at as early an age as possible. The fencing off of a part of the pen in such a way as to make it possible for the young ones to get into the enclosure, but impossible for the sow, and placing therein a flat shallow trough containing sweet new whole milk will be found of great value in this connection. The most scrupulous cleanliness must be observed, however, or serious digestive troubles are likely to result. In a short time skim milk may be gradually substituted and to this the addition of a mixture of equal parts of very finely ground oats or oatmeal, shorts, corn meal and oil meal will be found to give very satisfactory results.

Care must be taken to feed only small amounts of these foods at a time, but they may advantageously be fed as frequently as four or five times a day. If not on pasture some green feed, some sods, some roots or better still all three should be given them from time to time.

Pigs so fed will be practically weaned by the time they are eight weeks old or even sooner. In spite of every effort to anticipate the dangers of weaning time it is usually a rather critical period. Plenty of exercise, frequent feeds in small quantities of the above mentioned feeds and protection from wet and cold will, however, usually prove effective in getting them well started.

When it is decided to wean entirely, the feed should be gradually taken off the sow. She will on that account begin to give less milk and at the end of a week will be nearly dry, when she should be taken away out of sight and hearing of her young.

CARE OF THE BOAR.

The boar is usually able to serve sows when 5 or 6 months old. He should not be required to do so before he is 8 months of age, and should be used on but few sows even then. The amount of service that he may do will depend upon his development and condition. Careful watch should be kept to see that he is not losing in flesh on account of service performed. Young boars should never serve more than one sow a day, nor should they be expected to do that much for many days in succession. Mature boars may serve two in the day, and keep on at that rate for a considerable length of time if conditions are in every way favourable.

The boar should be kept apart from the sows in heat saving the time necessary to give one complete service. This service should, if practicable, be given when the oestrus or heat is nearly over. Service under such conditions is more likely to be effective than if given at the beginning of heat. Where animals of unequal size are

mated a breeding crate as per illustration will be found useful. To insure the boar keeping in good service condition he should have plenty of exercise. To permit this a good roomy pen or a large yard must be provided. In summer he should have at least a small pasture wherein to roam and root at will. Not infrequently returns of sows to service are due to the lethargic condition of the boar rather than to the sterility of the sows. Plenty of exercise, with the right kind of food, will almost entirely overcome this condition. The boar should be fed sufficient food to keep him growing rapidly, and in good flesh if young, and in good flesh in any case. He should not, however, be fed such foods as are likely to make him fat, but rather flesh and bone-forming foods. Ground oats, pease and barley, shorts, bran, oil meal, skim milk, &c., in varying proportions will be found to give good results. The addition of a considerable amount of roots or other succulent foods to the meal ration is very advisable, in fact almost imperative in winter or when no pasture is provided. Mangels or sugar beets will be found to be the most satisfactory for the purpose, although turnips, cabbage or kohlrabi will do.

FEEDING.

PASTURES AND PASTURING.

Under average Canadian conditions it will be found practicable and quite advantageous to give every pig intended for bacon production from 3 to 4 months on pasture. It goes without saying that every breeding pig should spend practically the whole warm or moderately warm part of the year out of doors. The advantages are various. In the first place, it will, in the case of breeding pigs, be found to be by far the most economical way of summering, while feeding pigs will be found to be very materially benefited in as much as they seem to be able to make better use of grain or meal fed them after the pasture period. The gains made while on pasture are not likely to be very rapid nor particularly economical, but the digestive powers seem to be improved, and the frame well developed.

It has been found advisable to have an area rather large in proportion to the number of swine to be pastured. This area should be divided into at least three parts, and a three-year rotation followed thereon. In following a rotation there are various advantages:—(1) A variety of crops may be grown, a very considerable improvement over the one crop plan. (2) The pigs may be changed over from one part to another, so not fouling the pastures so rapidly. (3) Advantage may be taken of the increased fertility of the pastured plot to take a crop of grain or roots every third year.

A rotation followed here that has been found very satisfactory is as follows:—1st year, rape and roots of various kinds, some of which are harvested and the balance pastured off. 2nd year, grain seeded down with various mixtures of clovers and grasses. The grain is used for soiling cattle or harvested when ripe according to the season and the condition of the crop. Great care is taken to see that the grain does not fall and so smother the grass and clover plants. It is cut on the first sign of falling. The various mixtures of grass and clover are pastured to a limited extent in the fall. 3rd year, The field is divided into small runs according to the kind of grass and clover, and the class of pigs. The plots pastured off first are, if necessary, ploughed up and sown to rape or pease, oats and vetches for pasture later in the season.

By following this rotation good pastures are available from early in May till the snow falls.

PREPARATIONS FOR PASTURING.

Before starting in to pasture pigs at all extensively some preparation must be made.

Fences.—Good pig-proof fences must surround the whole area. Probably the cheapest fence for this purpose will be found to be woven wire. A board fence is very effective, but lacks durability and is expensive. Barb wire fencing can hardly be made to turn small pigs. A good plan is to have a woven wire fence 2 or 3 feet high and two or

three strands of barbed wire above the same to turn the larger pigs. In addition some portable fencing should be on hand for dividing the large fields into plots. Wooden hurdles may be used and are fairly economical. Wooden framed wire netting hurdles are also very effective. Woven wire stretched tightly on very firmly set posts one at each end of the proposed division line with stakes at intervals is probably as cheap and easily handled a moveable fence as any. (See illustrations.)

Cabins.—Portable sleeping houses that may be easily moved from one plot to another are necessary and may be constructed at small expense. A good size is 8 feet square or 8 feet long by 6 feet wide. The side sills should be of good stout scantling 6 inches x 7 inches, and the floor of 2-inch plank nailed thereto. The upper part may have two forms, that is the roof part may come right down to the sills (see cut) or may rest on side walls about 2 or 2½ feet high. For sows with young the sort where the roof starts at the sill is somewhat to be preferred.

Feeding Appliances.—Where the pastures are any considerable distance from the feed room it will frequently be found advisable to have a portable feed cabin on wheels or runners. Where it is not desired to go to such an expense as building a portable feed cabin, a barrel on wheels may be fixed up quite cheaply. (See cut for both of the a).



PORTABLE FEED ROOM AND FEED BARREL ON WHEELS.

An excellent trough for outdoor feeding is described below. A trough 4 feet long will allow 6 pigs to eat in comfort, 3 on each side. For such a 4 foot trough secure:

- 1 two inch plank 1 foot wide, 4 feet long.
- 2 two inch plank 6 inches wide, 4 feet 4 inches long.
- 2 two inch plank 1 foot wide, 20 inches long.
- 3 inch boards 6 inches wide, 4 feet long.

The largest plank will constitute the bottom, the two short planks the ends and the two long narrow planks the sides of a flat bottomed trough. Two of the 6 inch wide boards should be nailed between the end pieces near the top in such a way as to make a V-shaped trough, save that they should not come together at the bottom by about 3 inches. The other 1 inch board should be nailed one edge up in a vertical position between the two ends. The upper edge should be about 1 inch below the open bottom of the false V-shaped trough and the lower edge about 4 inches from the bottom of the

trough. The purpose of the false upper trough is to allow the feeder to pour the feed into the trough even though the pigs are struggling to get at the food.

Such a trough is easily kept clean, easily filled in spite of crowding pigs, strong and durable.

PASTURE CROPS.

Rape.—As a green feed for soiling that is cutting and feeding green, or for pasture, rape stands unequalled, among crops suitable for swine. It should be sown in rows two feet apart on stubble, fallow or well rotted sod at the rate of three pounds per acre. It may be sown any time as long as there remains six weeks of growing weather before severe frosts are to be expected. If intended to be pastured the pigs should be turned in before the rape comes up to the top of their shoulders. No greater area should be given than they are likely to keep down to that height or lower. If not pastured or cut too close to the ground it will keep on growing as long as the growing season lasts. Greater returns may be expected from soiling than from pasturing a given area. Feeding pigs will generally make more rapid gains when it is being fed to them in moderate quantities in pens than when at pasture on it. Breeding stock are likely to do better when they are allowed to use it as pasture. Feeding pigs receiving all the rape they will eat or on rape pasture should receive somewhat less meal than they would if in their pens. From one-third to five-sixths of the regular meal ration should be fed, the more rapid the gains desired of course the heavier the meal ration.

Mature sows not in young require very little other food when on rape pasture. Young sows and sows in young need to receive at least half the normal meal ration.

Vetches.—A crop remarkably palatable to pigs and one that gives a fairly good return per acre is the common black vetch. It is very little if any superior to pease, however, and the seed is usually more expensive.

Hairy Vetches make a very good green feed for swine but the seed is exceedingly expensive and a large amount is required per acre. It has, however, not infrequently stood through the winter here and so might be utilized for an early spring pasture. Like rape it will grow up again if not too closely pastured or clipped.

Oats and Pease.—These two sorts of grain mixed in equal parts by weight and sown at the rate of three bushels per acre furnish a pasture or soiling crop that gives very good returns per acre. Either sown alone is fairly satisfactory but not nearly so valuable as the combination.

Soja Beans.—A fairly palatable soiling crop high in feeding value has been produced by sowing Soja beans at the rate of 40 pounds per acre in rows about 20 inches apart. They have never been pastured here and would most likely not prove very satisfactory for feeding in that way. The green varieties are the best and should be sown in the latter part of May.

Red Clover.—Sown with grain and allowed to get a good start in the fall, red clover may be expected to yield a palatable and abundant supply of forage or pasture for pigs in May and June. If pastured off it will be found necessary to ring the pigs. Sows on clover require but very little other food.

Alfalfa.—On well drained soil in good heart and tilth in almost all parts of Canada, alfalfa may be expected to grow well and to furnish a most excellent and abundant supply of pasturage. It seems peculiarly well fitted for swine but should not be pastured too severely for fear of damaging the roots. The superiority of this crop over most other forage crops for swine or other stock is such as to much more than make up for the slightly greater cost of seeding down. If cut early and well cured pigs eat it freely in the form of hay.

Artichokes.—This crop has been tried here several times and given very satisfactory returns indeed for the outlay. The artichokes should be planted much as are potatoes early in the spring. The crop is not usually ready for use till about the end of September. The best method of using them is to turn the pigs right into the lot and let them root. Frost does not injure the artichokes and any roots left in the ground may be pastured off the next spring or left as seed for another crop. The most economical and rapid gains ever recorded at this farm were made with pigs pastured on artichokes and receiving a fairly liberal meal ration. They are somewhat superior to potatoes. The chief objections to the crop are the difficulty in securing seed and the rather short period during which they may be fed. They may be harvested and fed in winter but the harvesting is an expensive operation.

Roots.—Mangels, carrots or turnips may be used as pasture in October or earlier. They are probably quite as economical when so fed off as though fed to pigs in pens.

ROOTS AND GREEN FEEDS FOR WINTER FEEDING.

Just as pasture or soiling crops are valuable in summer, so are roots or some form of succulent feed almost indispensable in winter where successful bacon production operations are to be carried on. These feeds are valuable not only on account of economy, but also because of the good effect they have upon the health and digestion of the animals fed. Many experiments have been conducted here to gain some information as to the best green feeds for winter, as to their value compared with grain or meal, as to the best way to feed them, and as to the quantity to feed to get the best results. In a general way it may be stated that our experiments rank succulent feeds available for winter in the following order according to palatability, and value as flesh producers: Artichokes, potatoes, sugar beets, mangels, carrots, turnips, small apples, pumpkins, kohlrabi, cabbage and ensilage. According to the method of preparation and the kind of succulent feed, 100 pounds of mixed meal is worth from 500 to 700 or 800 pounds or even more of the succulent feed.

Some of these green feeds may be fed best one way, and some in other ways, as indicated below, and generally speaking from 3 to 4 pounds of succulent feed to 1 pound of meal gives the most economical gains of the best quality of meat.

Apples.—Refuse apples of all kinds have been fed to pigs here in large quantities. They are not particularly valuable as a feed for fattening pigs, but seem to do very well along with a small quantity of meal for dry brood sows.

Cabbage.—Generally speaking, cabbage are too expensive to feed to swine, but occasionally they are available and seem to be quite palatable. Some feeders report them to be rather constipating than laxative in effect.

Carrots.—These roots have been fed here to a limited extent for pork production. They are not quite so palatable as are mangels and sugar beets. They do not keep so well in winter as do most other roots, hence are not to be very highly recommended.

Clover Leaves.—Clover leaves and small stems gathered from the unloading floor in haying time, stored in sacks and steamed in winter or at any time, make a most excellent drink and feed for swine of any age. Such a drink seems as valuable and quite as palatable as skim milk. Especially is this the case if it be fed warm.

Ensilage.—Corn, clover, alfalfa, corn and clover, and alfalfa and corn ensilage have all been fed here to a greater or less extent. Ensilage containing clover or alfalfa has invariably proven welcome to swine, while pure corn ensilage also has been eaten fairly well. The addition of some dry meal to the ensilage causes it to be eaten quite readily.

Kohl Rabi.—This plant has been fed here to a limited extent only, but has proven a fairly welcome feed to swine of all classes.

Mangels.—For sows and general feeding Long Red or Gate Post mangels are difficult to improve upon. They are exceedingly palatable, may be fed in large quantities, do not need to be pulped, and are better suited for the requirements of sows carrying young, and for growing pigs than are sugar beets or any other sort of green feed we have tried. They should not be cooked. Other varieties of mangels are also useful, but apparently not so welcome to the pigs as are the Long Reds. We have fed as high as 25 pounds a day of these roots to dry sows or to sows not far advanced in pregnancy. As the period of pregnancy advances, however, it will be found advisable to decrease the roots and slightly increase the meal ration.

Potatoes.—These tubers fed alone raw scarcely suffice to sustain life in pigs, but cooked and a moderate amount of meal, 20 pounds of meal to 100 pounds of potatoes, mixed with them, they make a most excellent feed for fattening pigs, and produce a very fair quality of bacon. Potatoes in small quantities fed raw, help to keep pigs in health where other succulent feed is lacking.

Pumpkins.—To get the greatest returns from this fruit it must be cooked. Boiled in double its weight of water and half as great a weight of meal as of pumpkin added it will be found to furnish a most appetizing and fattening feed. The quality of meat so produced here has been very good. Rapid gains may be anticipated with a slight tendency to over development of fat.

Sugar Beets.—Sugar beets are easily the most palatable of the different sorts of roots that have been fed here. They may be fed to greatest advantage by pulping them. From 3 to 6 pounds a day per 100 pounds live weight according to rate of gain desired has been found to give best results. The meat produced on this feed has always proven of a superior quality. They do not need to be cooked. They are not so suitable for young pigs, brood sows and breeding stock generally as are some of the other roots, mangels and turnips for instance.

The Sugar Mangel, a root half way between the sugar beet and the mangel, has been fed extensively here with very good results. It has, however, not proven quite so good as mangels for breeding pigs. If only one kind of root can be grown it is possibly the best that could be chosen.

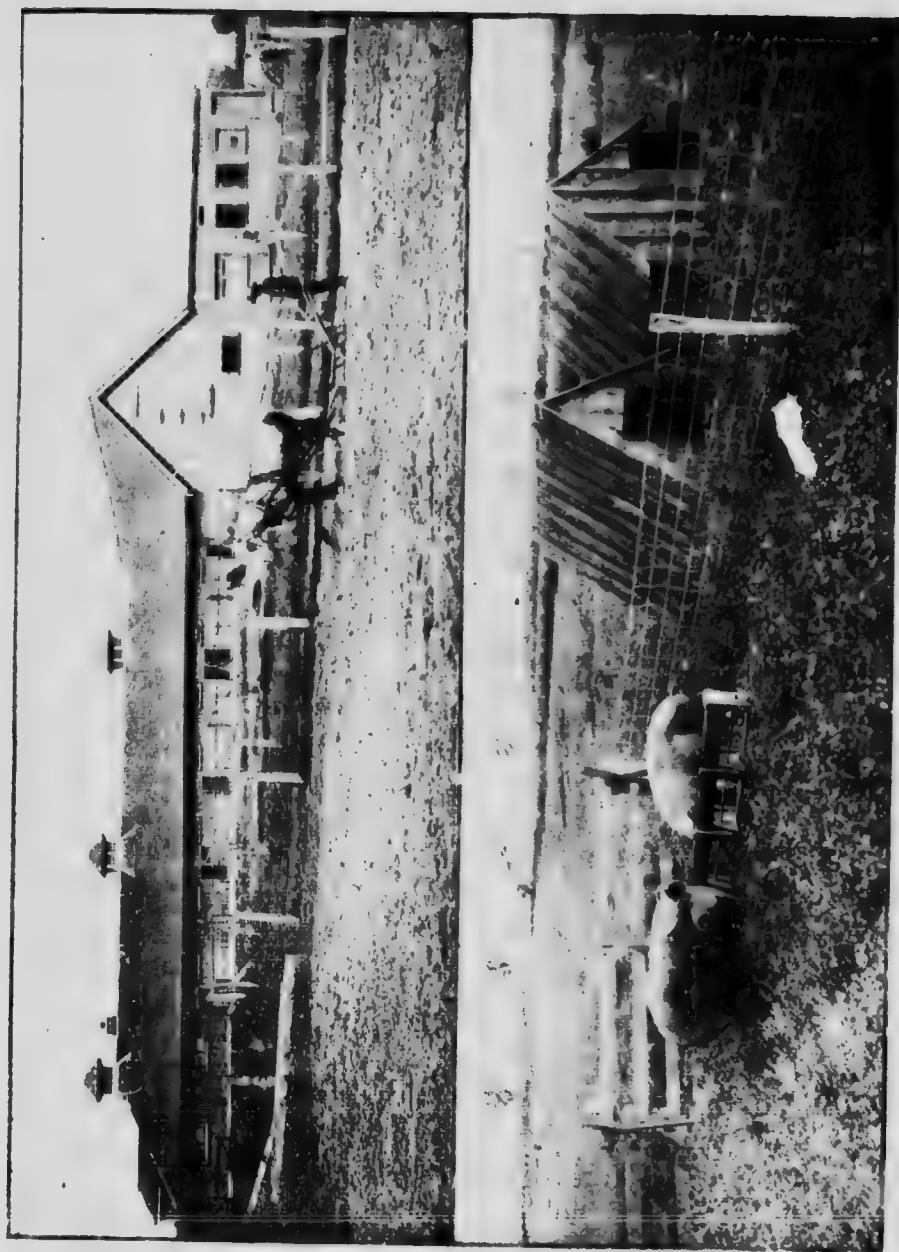
Thousand Headed Kale.—This plant, which resembles rape, has, like the latter, proven valuable as a feed for swine, but is not likely to be found quite so useful. It should not be sown quite so thickly as rape, as it makes a somewhat stronger growth.

Turnips.—Where other roots have not been fed, turnips will prove quite palatable and give very satisfactory returns. They do not seem at all to the liking of pigs that have been getting sugar beets or mangels. They may be fed cooked, when they seem to give somewhat better returns and are much more welcome to the pigs. If for sows, they may be pulped and mixed with the dry meal in the proportion of about 10 of meal to 100 of roots. Fed in this way they are a very valuable food.

PREPARATION OF FEED.

Much will be said incidentally in discussing the various feeds as to the best method of preparing each. A few general remarks *re* our findings in this matter will, however, probably be of some value.

Into the preparation of grains for feeding to swine, various considerations enter. Briefly expressed they are:—cooked *versus* raw; warm *versus* cold; ground *versus* whole; wet *versus* dry; soaked *versus* dry; thin *versus* thick slop.



1. Piggery at Central Experimental Farm, Winter quarters for Sows at right-hand end.
2. -Cut showing Sows in Alfalfa pasture, two styles of cabins, two styles of movable fence and a handy movable trough.

In the preparation of roots, the considerations are whole *versus* pulped; raw *versus* cooked; and alone *versus* mixing with meal.

Cooked versus Raw.—Many experiments go to prove that raw grains are just as valuable if not even more valuable than cooked grain for swine.

Warm versus Cold.—There is no doubt that feeding warm feed once or twice a day in cold weather is a decided help to the thrift and health of pigs. Particularly is this true if the pigs are young and in rather cold quarters. Warming must not be taken to mean cooking.

Ground versus Whole.—Almost all grains should be ground for swine. This is more imperative in the case of oats, pease and barley than for most other grain feeds. Soaking for 36 to 48 hours before feeding makes up for lack of grinding to a certain extent. Grinding is particularly imperative where very young pigs are being fed.

Wet versus Dry.—Meal fed dry is probably more perfectly digested than similar meal fed wet. Soaking meal for 24 to 36 hours turns the table in favour of the wet. The objection to dry feeding is that the pigs scatter and lose more or less on the floor.

Thin versus Thick Slop.—For fattening pigs, a thick slop is undoubtedly to be preferred. For pigs on pasture or breeding stock, a thin or dilute slop is more suitable as they are better satisfied when through eating, even though a light ration has been fed.

Roots.—It is usually better to feed green or succulent feed whole and apart from the meal. Where the roots have to be pulped, however, as is the case with sugar beets and turnips, dry meal may be mixed with the pulped mass and prove very satisfactory. Roots or succulent feeds need, with one or two exceptions, never be cooked. Potatoes, turnips and pumpkins, however, are more valuable cooked than raw.

SOFT PORK.

At factories where many pigs are slaughtered and cooled daily, there are usually to be found among the carcasses a number that are described as 'soft' or 'tender.' In these carcasses the fat and sometimes the lean meat is found to be more or less yielding to pressure, somewhat greasy to the touch and the whole side not infrequently limp and flabby. From such carcasses only a very inferior class of bacon can be produced, and they must therefore be sold at considerable loss. The proportion of soft or tender sides varies greatly according to season and district from which the hogs come. A study of the matter has revealed various causes as affecting the quality of the meat. Not to enter too minutely into a discussion of the different experiments or the results obtained it may be stated in a general way that the influences or conditions affecting the quality of meat so far as firmness or softness are concerned are as follows:—

1. *The Kind of Feed.*—Certain kinds of feed seem to affect the firmness of the meat by supplying elements of a character likely to render the fat soft. Of such feeds, corn is probably the most largely fed and has probably a greater quantity of 'Soft Pork' to its credit than any other feed. Rye is another feed that has not proven satisfactory in this respect. An excess of green crop or pasture is likely to prove injurious. Beans also have proven to be productive of soft pork, in fact, all pigs fed on beans here yielded very soft sides.

2. *Method of Feeding.*—Many feeds if given in proper proportions to other feeds in the ration are not at all injurious, although exceedingly objectionable if fed exclusively or in too great quantities. Under this class come corn, rye, pasture and some sorts of roots. An exclusive meal ration not infrequently leaves soft sides even though

the meal be varied and of the kinds best suited for firm pork production. On the other hand certain feeds seem to overcome the injurious effects of other feeds and a first class quality of meat is produced in spite of the fairly large use of the otherwise injurious feeds. In this class rank skim milk, whey and roots of some kinds.

3. *The Thrift of the Animal during the Feeding Period.*—Pigs that have come along steadily at the rate of say 1 pound per day from birth are not so likely to give soft pork as are others on the same feed that have suffered from indigestion or that have been set back in any way. Unthrifty pigs are almost certain to yield soft pork.

4. *Rate of Growth or Length of Time Required to Reach a Given Weight.*—Pigs fed too rapidly are likely to produce an inferior class of pork, both soft and too thick, while pigs fed too slowly not infrequently produce soft meat, particularly is this true if they are brought to the block a little on the thin or unfinished side. Unfinished pigs, old or young, quite frequently yield soft or tender sides.

5. *Health and Method of Feeding Immediately Before Slaughtering.*—Pigs unhealthy, in heat, or suffering from any check in growth at time of slaughtering are likely to leave soft carcasses.

NOTES ON GRAINS AND MEALS.

BARLEY.

In Europe barley is looked upon as the ideal feed for fattening and finishing off bacon hogs. In Canada most experimental work goes to support this view. So favourably is it known in fact that it has practically become a standard by which other foods are judged so far as their value for bacon production is concerned. It should be fed ground. Soaking for 24 hours or longer before feeding will in part make up for lack of grinding. It is not a very good feed for sows suckling their young, nor for very young pigs. It may be fed alone to advantage, but will give somewhat better results if ground pease, shorts or oil meal in small quantities or well ground oats be added. It makes a prime quality of bacon wherever other conditions permit.

BEANS.

Beans may be fed whole, ground, raw or steamed, but are most commonly fed steamed or cooked. They produce a very inferior quality of bacon when making up the larger part of the ration.

BLOOD MEAL.

Prepared by drying and powdering the blood in slaughter houses, blood meal is very rich in flesh-forming material, and has generally given good results so far as economy of gains, quality and firmness of bacon are concerned. It must be fed in very small quantities and as part of a ration otherwise low in flesh-forming material, such as corn. It has been used to some extent as a substitute for skim milk, in which capacity it has proven fairly valuable.

BRAN.

Save for fairly large pigs and breeding stock, bran is not a very valuable feed. It is too coarse and too difficult to digest. It produces a good quality of meat, however, and is a useful food for sows carrying their litters, or suckling their young.

BUCKWHEAT.

Buckwheat has been fed quite extensively to swine in some parts of Canada, and has given good results. It may be fed alone, but does better if mixed with barley, oats

or corn. It gives from a rather poor to good quality of bacon according to conditions under which fed.

CITY REFUSE.

The refuse from hotel kitchens, &c., has been fed extensively by many feeders. It has been found valuable for stockers and dry brood sows, but is not to be recommended as a feed for the finishing off period. It is claimed to have an injurious effect upon the quality of meat.

CLOVER HAY.

Clover hay, cut a little on the early side, or the leaves which fall off while unloading, makes a capital feed for young pigs and breeding stock. The tea made by steeping such hay in boiling water has shown itself to be nearly as valuable as skim milk for young pigs.

CORN.

Packers generally condemn the use of corn for pork production. Extensive experiments here have shown it to be a fruitful cause of soft pork where fed in any considerable quantities. It is, however, a very economical feed for pork production and may be fed to a considerable extent if mixed with other feeds.

It should be ground and mixed with oats, pease, barley, shorts or bran to insure a fair quality of bacon. Fed at the rate of about one pound of corn to two of skim-milk it may be expected to give very cheap and very rapid gains and to produce a very fair quality of bacon. Without skim-milk or whey it is practically certain to have an injurious effect upon the firmness of the bacon as well as to seriously modify the desired proportion of lean to fat meat. The meals the most suitable to mix with it are pea, oat and barley, shorts and bran also may be used to advantage.

Pumpkins or roots steamed fed along with it give very rapid gains.

CORN AND COB MEAL.

Corn and cob meal has generally proven too coarse and harsh for young pigs but may be used to some extent for mature or fairly large pigs. It has not been fed here but other feeding stations report favourably so far as economy of gains is concerned. It is not likely to prove advantageous to bacon producers, since many of the objections offered against corn are equally applicable here.

FROZEN WHEAT.

Some years ago frozen wheat was available in considerable quantities and was fed quite extensively. It was found to be very valuable as a feed for bacon production. The meat was of good quality and was produced at the rate of one pound live weight for from $1\frac{1}{2}$ to $5\frac{1}{2}$ pounds of the frozen wheat. It is rendered somewhat more palatable and slightly more useful by the admixture of crushed oats, ground barley, bran or shorts.

GLUTEN.

Gluten has been fed in limited quantities, but has not proven very satisfactory for either bacon production, young pigs or breeding stock. It seems to be rather unpalatable and produces soft bacon.

OATS.

Grinding is essential in order to get the greatest returns from oats. It is an excellent feed for boars and sows when soaked for some time before feeding. To be

fed to young pigs the hulls must be sifted out or the whole mass ground very fine. The addition of corn meal and oil meal in equal parts say one pound of each to three pounds of oats constitute an excellent ration for stock of any age. Small or frozen wheat and oats (about equal parts) ground together make excellent feed for pigs of any age. They produce a good to excellent quality of bacon.

OAT FEEDS.

A number of bye products from oat meal mills and other cereal food factories bearing the names of Oat Dust, Oat Feed, Meal Seeds, &c., contain usually a very large proportion of fibre to digestible material. They vary greatly in composition and should not be purchased for pig feeding without a guarantee of their real food value being given.

OIL MEAL.

Of all the meals available for pig feeding, oil meal is probably the most valuable for sows suckling their young and for the young after weaning if fed in moderation. It should never exceed twenty per cent or one fifth of the whole ration. It may, to a large extent, be used as a substitute for skim-milk. It is not to be recommended as a finishing off feed for bacon hogs.

PEASE.

'Canadian Pea Fed Bacon,' so extensively advertised in Great Britain, would appear to indicate the superior value of this much sought after farm product for bacon production, and it is undoubtedly of very high value as a feed for the production of good firm bacon. It also stands high as a feed for young pigs and breeding stock of all classes at practically all times. It should, however, never be fed alone, and further, the pease should always be ground. The most suitable feeds for mixing along with the pea meal are ground oats, barley, corn, bran or shorts. Pigs fed on pea meal alone do not thrive, do not get fat, and produce a very inferior quality of meat, hard and dry.

PEA FEEDS.

Pea feeds under various names are bye-products of prepared food factories, and vary in composition. Some of them are quite equal to pea meal in feeding value, while others are of comparatively small value. They are, however, in most cases excellent feeds for supplementing the average cereal ration or for feeding to young growing stock.

RYE.

Rye has not been fed very extensively for pork production Canada, but experiments appear to indicate a value somewhat similar to, though not quite so high, as for wheat. It should be fed in conjunction with some other somewhat more bulky food, as ground oats and barley. It produces a fair to good quality of bacon, when judiciously fed.

SHORTS.

Shorts, although as a rule much superior to bran for pigs, is not infrequently so coarse or contains so much fibre as to be very little better than bran for young pigs. Good shorts, however, that is shorts containing a fairly liberal admixture of white material is certainly a most excellent feed for pigs of all classes. It is, under such conditions, one of the very best single feeds for young ones just weaned. A slight admixture of oil meal improves it.

SKIM MILK.

According to findings in Europe and America about 600 pounds of skim milk equal 100 pounds of mixed meal for pork production. The value of skim milk in terms of the amount of meal it equals is a very variable quantity. The kind of meal, the relative weights of meal and skim milk, and the condition of the milk fed all influence results very markedly. Probably the best proportions between the two would be 3 of milk to 1 of meal. The meal along with which it is likely to give the best results is corn. It should be fed warm and sweet. If impossible to feed sweet and warm at all times it should always be fed sour and cold. Uniformity in quality, quantity and temperature at all times adds very materially to the net value of a given amount fed in a given period of time.

SLAUGHTER HOUSE REFUSE.

This class of feed, like city refuse, may be used to advantage for breeding stock and stockers, but has, it is claimed, an injurious effect upon the quality of the meat produced when fed to fattening pigs.

SPELTZ.

This cereal has been fed to only a limited extent in Canada, but has proven fairly satisfactory so far as economy of pork production is concerned. It seems to be nearly as valuable as mixed grains pound for pound.

SPIRIT GRAINS.

Spirit grains fed here to a limited extent have, so far as economy of gain is concerned, proven very valuable for bacon production. They should be fed along with corn or barley, when they will be found particularly useful.

STOCK FOODS.

Various stock foods have been tried here to a limited extent, but have proven neither profitable nor satisfactory. Similar experiments conducted in England and in different state experiment stations in the United States have given similar results.

TANKAGE.

This bye-product of the meat packing houses has not been fed to any considerable extent here, but seemed fairly satisfactory when ever used. It must be fed in small quantities, and will take the place of skim milk to a certain extent as a factor in the quick and economical production of pork.

WEED SEEDS.

The weed seeds and the small wheat from elevators have been fed quite extensively, with good results from an economical standpoint. Of the various weed seeds commonly found in grain that of the pig weed (*Chenopodium Album*) is the most common, and has been fed to advantage by many farmers as well as by experimental feeders. Not much is known as to the quality of the meat produced by these seeds.

WHEAT.

As a single feed for pork production wheat stands near the top of the list. It is a most excellent feed for young and old, comparing very favourably with pease in its value for pork production. It may, however, as is not the case with

pense, constitute the exclusive meal ration of swine at almost any age, and may be expected to produce a fair to excellent quality of bacon at a rather small outlay in pounds of grain for pounds of gain live weight. It should be fed ground or well soaked. The addition of crushed oats, barley or corn to the wheat will materially decrease the amount of food required for one hundred pounds gain.

WHEY.

Whey is supposed to be worth about half as much pound for pound as skim milk. It has a very good effect upon the quality of the bacon produced. The portion fed daily should be uniform in quantity, quality and temperature. Sour whey is quite as good as sweet whey, provided it has not been soured more than 24 hours, and has been kept in a clean vat.

WHOLE MILK.

Whole milk is too expensive a food to use in large quantities. It is, however, about the best food known for pork production. If for very young pigs, a small amount of warm may be used to advantage. Very young pigs entirely dependent on fresh whole cow's milk should get very rich milk (containing from 6 to 8 per cent of fat), to which a small amount of sugar should be added.



A WINTER PIG-PEN IN MANITOBA.

HOUSING.

METHODS.

In summer, as already indicated, portable cabins are likely to prove the most satisfactory sort of pig house. Experiments conducted here with various sorts of pigs of different ages go to show that under average Canadian winter conditions wintering in such cabins is an unprofitable plan.

CHEAP WINTER QUARTERS.

Sows may be wintered in much colder quarters than feeding pigs. A large well lighted room, as shown in the floor plan, has been found very satisfactory. A glance at the photo of the piggery at the Central Experimental Farm, Ottawa, on page will show such a building at the far end.

In Manitoba, Mr. S. A. Bedford, Superintendent of the Experimental Farm, reports very good results from wintering sows and breeding stock generally in a pen made by constructing a low framework of poles on posts, with a similarly constructed passage leading out of it on the south side, and then covering the whole structure with a large amount of straw (see cut, page 22). The writer saw pigs come out of such a pen in 30 degrees below zero weather, eat their dinners and retire apparently happy and evidently in perfect health.

REQUIREMENTS OF A GOOD PIGGERY.

Light.—Every perfectly satisfactory piggery for winter use must be well lighted from the south, east or west. If from all three directions, so much the better. Direct sunlight rather than diffused light is what is required to insure health and aid in sanitation.

Warmth.—Warmth is another important feature of the satisfactory piggery. Walls such as described below will, other conditions being favourable, prove sufficiently non-conductive. Warmth must never be secured at the expense of pure air. If it is impossible to ventilate properly and maintain a sufficiently high temperature with the natural heat of animals, it might be found advantageous to use artificial heat. In any case, pure air is more to be sought than a high temperature in winter quarters.

Freedom from Moisture.—Freedom from moisture on the walls and ceilings is another important requirement. This may be insured by proper construction of walls and ceiling and by perfect ventilation. The walls and ceiling should be built with a dead air space. This space should have building paper on both sides of it. That is, a wall, starting from the outside, should consist of matched inch lumber, tar paper, studding tar paper, matched inch lumber. A similar construction should be called for in the ceiling.

Material.—Another factor affecting the freedom of a piggery from moisture is the material used in construction of walls and floor. Wood, although not very durable, is quite likely the best suited for the walls. Cement blocks, or hollow cement walls are likewise said to be very satisfactory. Wooden floors are a constant source of annoyance on account of the quickness with which they wear out and the practical impossibility of keeping them clean. Cement floors are said to be too damp, but a cement feeding floor, with a good tight wood floored sleeping room is likely to prove satisfactory.

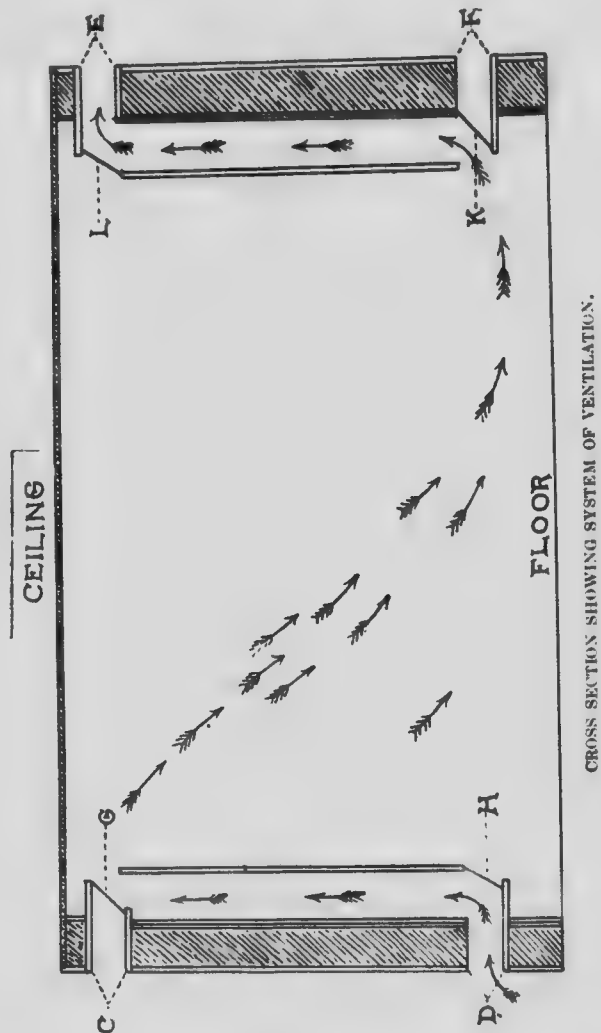
Ventilation.—A sufficient and effective system of ventilation is another very important requirement of a good piggery. The air should be admitted in such a way as not to allow the cold air to come in direct contact with the pigs, and the foul air had better be removed from near the floor. If the wall plan or roof plan is not such as to admit of the introduction of the system, described and illustrated on page 24, some other simple plan may be devised. Ventilation arrangements must not be neglected, however, and an outlet alone is not a perfect system.

A SYSTEM OF VENTILATION.

The system outlined is one of several that have been tried in the stables at the Central Experimental Farm, during the last eight or ten years, and is the one that has given the best satisfaction wherever tried.

Described in a general way it may be said to consist of a number of hollow shafts or tubes placed inside the stable in contact with or close to the walls. These hollow shafts start about one foot or eighteen inches from the floor and extend vertically upward to within 3 or 6 inches of the ceiling. At the top and bottom, these shafts turn at right angles and traverse the wall. They are also open to the air, that is, inside or out-

side air, that shall flow through these shafts is controlled by means of dampers at the top and bottom as described below.



The number and size of these ventilating shafts will of course depend upon the size of the piggery and the number of swine therein. There should, if possible, be one or more on each outside wall. The total area of the openings through the walls at the bottom should show about 3 square inches per animal housed in the pen. To illustrate, a piggery holding 30 head of swine should have 4 ventilators each 2×10 or 6 ventilators $2 \times 6\frac{1}{2}$ or 8 each 2×6 inches inside measurement. The large area required is on account of half or more of the ventilators having to serve as outlets, as will be seen later, because while those ventilators on the side or sides which the wind strikes serve as inlets the ventilators on the opposite side serve as outlets.

In above diagram ventilators are shown on opposite walls and the swinging parts or doors set to allow air to enter by way of D and G from the left and left pen

at the

by way of K and E through the shaft on the right entering it at the bottom K and going up and out at E, as indicated by arrows.

On the left, the trap or door H is set so as to prevent any air entering the stable or going out at that point, while G is set to prevent any air entering or leaving the room at opening C. The same may be said of doors L and K.

The doors are placed in these positions when the wind is coming from the left side, but when the wind happens to strike the right hand side of the stable then the position of all the ventilators should be reversed and the air should enter by way of F and L and leave by way of H and C. The ends of the ventilators should not project from the walls on the outside.

The trap doors may be constructed of wood or sheet zinc and may be controlled by means of a projecting handle or by means of cords.

By letting the upper doors hang vertically some of the warmer air near the ceiling may be drawn off if the temperature become too high.

If the wall be built as described on page 23, the space between two studs may be used in the place of the shaft shown, and so nothing but the inlets and outlets show. Under such conditions the doors would have to be hung in the middle of the wall and would be somewhat more difficult to manipulate.

THE FLOOR PLAN.

A frequently neglected feature in building piggeries is the providing of convenient passages for cleaning, bedding and moving pigs from pen to pen. A study of the floor plan of a piggery on page 26 will show one way of laying out pens to insure convenience in all these matters.

EXPLANATION OF FLOOR PLAN.

The floor submitted on page 26 is not given as being the ideal, since no plan could possibly be the best for every feeder. It includes several ideas, however, which could be incorporated into almost any plan of a piggery, and these ideas can be best expressed by giving the diagram included.

The building may, of course, be of any necessary length to accommodate from 20 to 100 pigs or more. Two rows of pens flank the passage, one on either side.

Doors two feet wide open off the passage into each pen. The feeding is done from the passage, and for a discussion and exemplification of methods see pages 16 and 17.

The pens are 10 feet front and 12 feet deep, being large enough for from 4 to 8 animals according to size.

In the plan FL, FL, FL are feeding floors 6 x 10.

L, L, L—Low partitions separating the beds from feeding floors.

D, D, D are swinging doors or partitions, 6 feet long and 4 feet high, serving as partitions between pens when at right angles to the passage, and serving to confine pigs in closed space when parallel to passage.

When D, D, D, are all parallel to passage, a truck or barrow may be run along FL, and the pens easily cleaned.

Tr, Tr, Tr.—Troughs made of cement or hardwood and iron trimmed.

Dr, Dr, Dr.—Doors opening into yards; d, d, d, are doors from pens to passage.

K, K, K.—Posts against which D, D, D close.

B, C.—Breeding crate. (See illustration, page 8.)

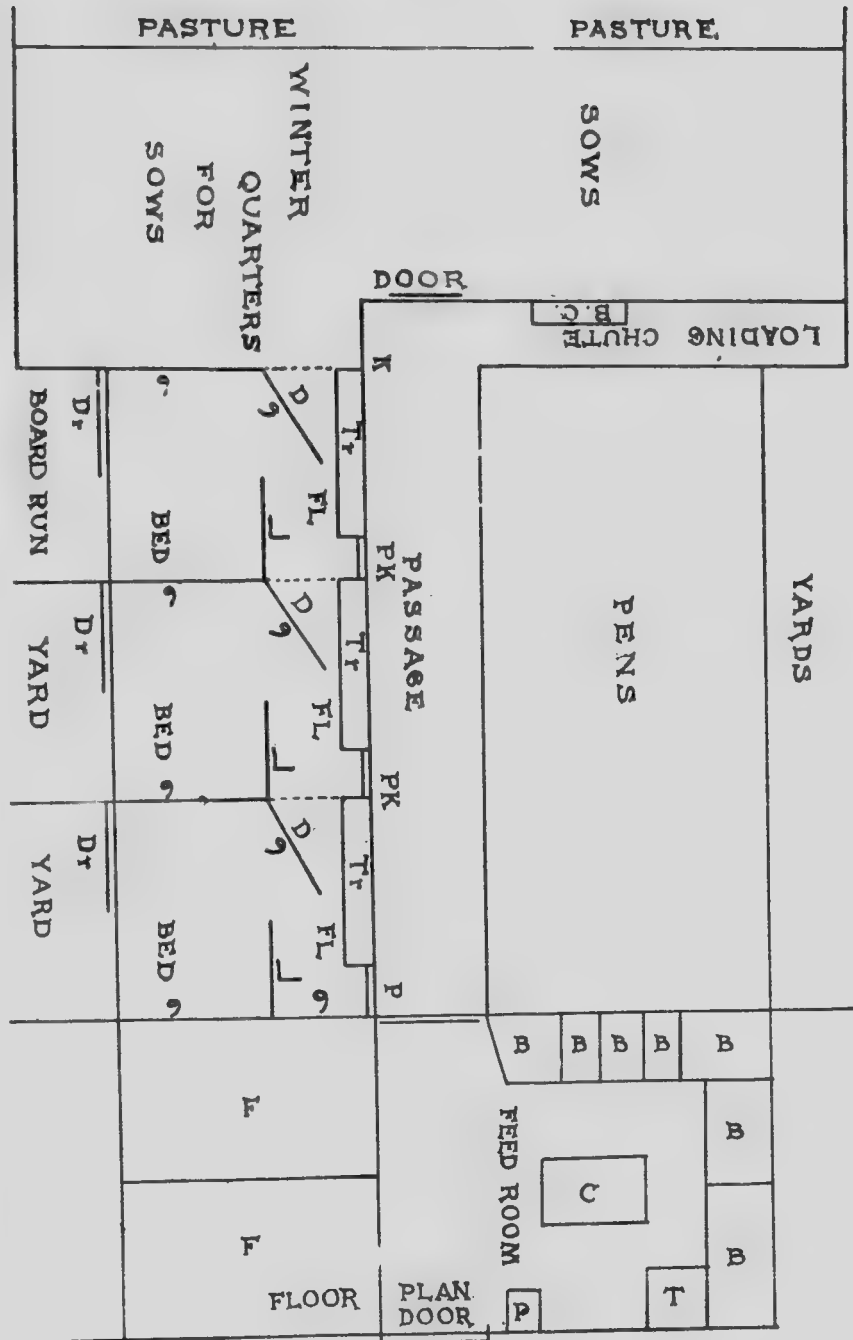
F, F.—Farrowing pens fitted up as described on page 10. In the feed room the cooler or heater C occupies a somewhat central position.

B, B, B., &c.—Bins for feed.

P.—Pulper.

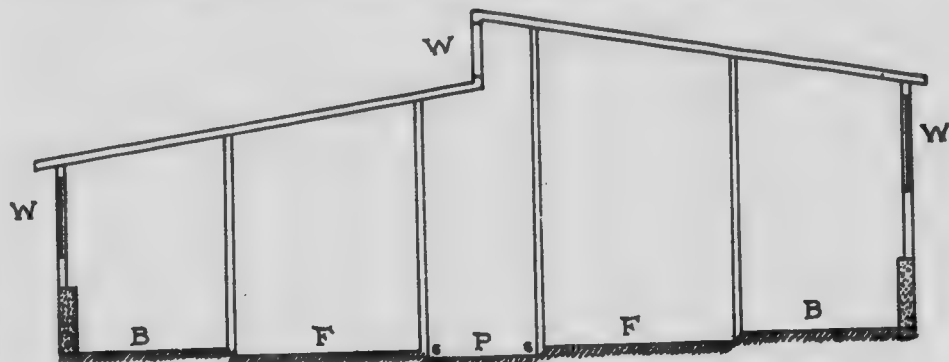
T.—Trap-door to root cellar.

The feed room floor should be of cement, supported by railroad iron.



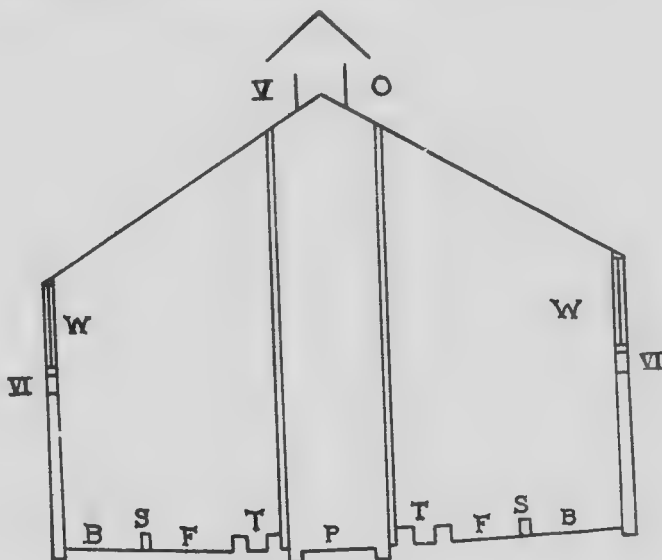
FLOORS.

A glance at the floor lines in cross sections A., B., C., D. and E., will prove more instructive than any word picture. In cross section A. the floors slope toward the passage P. B. is the bed, 8 inches above the feed floor F. F., feed floor, with slight slope towards passage P. T., cement trough. G. G., gutters along passage.



CROSS SECTION A.

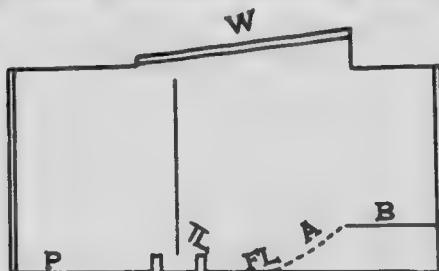
In cross section B., B. is the bed. S. is a 4 x 4 inch scantling or cement straw guard around the bed. F. is the feed floor with slope toward the passage P. Along P. run two gutters for carrying off liquid manure.



CROSS SECTION B.

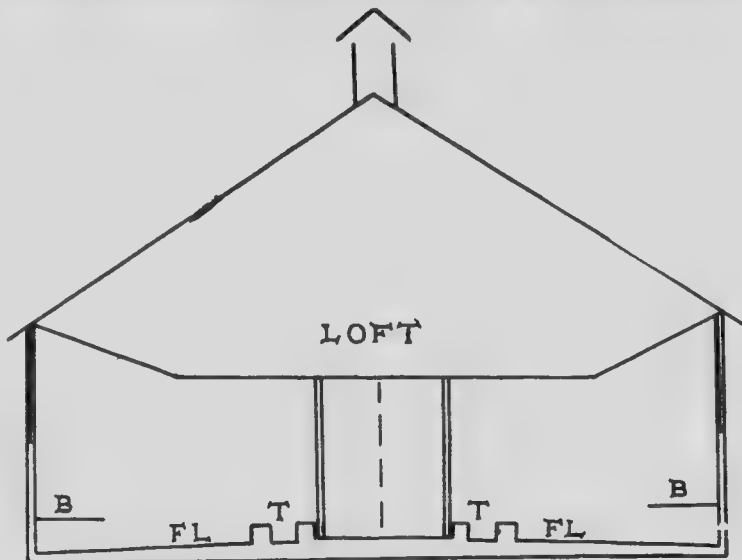
In cross section C., P. is the passage T. L., the trough part of which is in the cement passage, permitting the placing of the feed in the trough without any moving of the front partition, as shown in cut on page 29.

F. L. is the feed floor sloping away from the trough. B. is the elevated bed 2 to 3 feet high, reached by means of approach indicated by dotted line A.



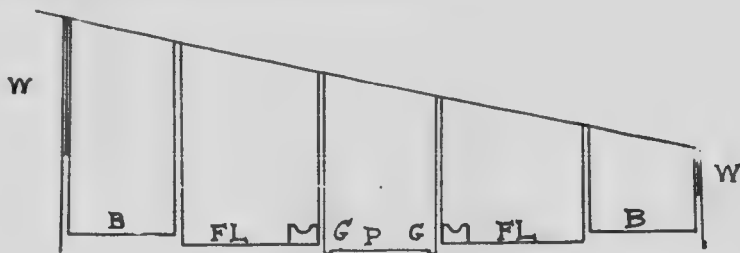
CROSS SECTION C.

In cross section D. the floor falls away from the trough and from one side to a hole down through the floor in one corner of each pen. B. B. are elevated beds.



CROSS SECTION D.

In cross section E the floor plan is the same as in B.



CROSS SECTION E.

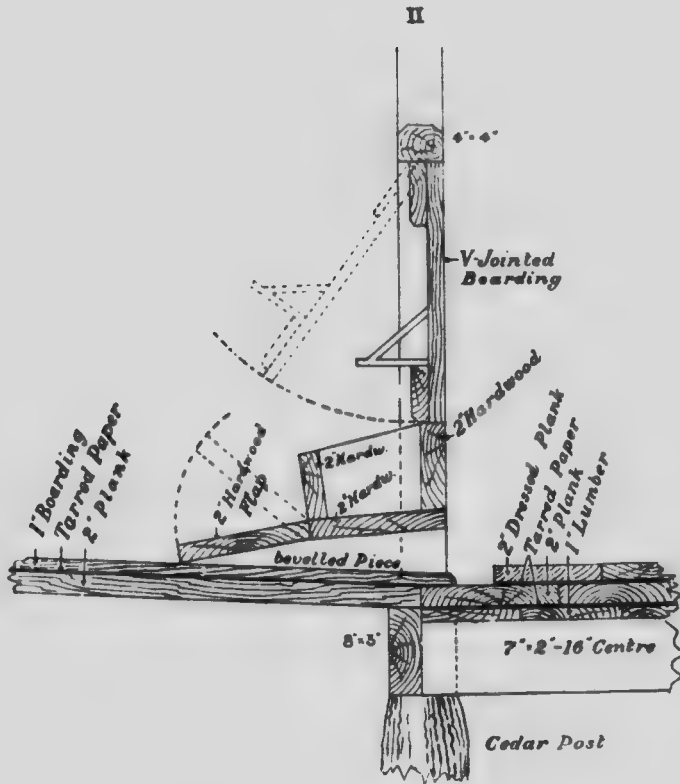


DIAGRAM SHOWING METHODS OF FEEDING PIGS AND DRAINING PENS.

NOTE.—In the figure the details of the placing of the feeding trough, the hinged foot board in front of the trough and the swing door for convenience in feeding are all shown.

The construction of the pen floor with slope to gutter in passage floor may be seen on right.

The fall in the floor towards the feeding-trough permits the swine to lie on a dry bed at the back of each pen.

The absence of air space under pens makes for greater warmth. Therein lies one of the great advantages of the cement floor.

DRAINAGE.

Drainage is one of the prime necessities of a good piggery. The pen floors should be built to slope either to or from the passage, 2 inches in the 12 ft. will be found to be ample pitch. If it slopes to the passage a small drain will be necessary down each side of the passage. If it slopes from the passage a drain all along the back of the pens and under the beds will be necessary. The better plan is usually where it slopes to the passage, and runs along it to some underground drain.

PARTITIONS.

The question of partitions is of considerable importance. For the dividing partitions in pens there seems to be no doubt that wood is the most satisfactory material. For the partitions next the passage it is just possible that wire may have some advantages. Very strong wire well stayed by numerous strong uprights must be used. Wire partitions are of value in making a pen light and airy, but are a disadvantage in leaving the pigs more exposed to draughts which often cause serious troubles.

FEED ROOM.

The feed room should be provided with a heater if much winter feeding is to be carried on. Around the walls should be feed bins and a small root pulper should find a place on the floor. Under the feed room should be a root cellar, and over it a loft for storing straw with a chute leading therefrom into the passage.

THE ROOF.

Many and various are the styles of wall and roof that are advocated. Some of the best may be understood by again referring to diagrams A, B, C, D and E.

The roof plan, lighting and ventilation are so closely related that they should be considered at one and the same time.

In section B, the roof is a common half pitch, and the windows are placed as high as the eaves will allow on both sides and as low as safe from pigs. Such a building should run north and south. V.O. is the foul air outlet at the top, and V.I. on either side the fresh air inlets. These latter openings may be closed by a species of trap door controlled by a string reaching to the passage. V.O. also may be opened by means of a swinging trap.

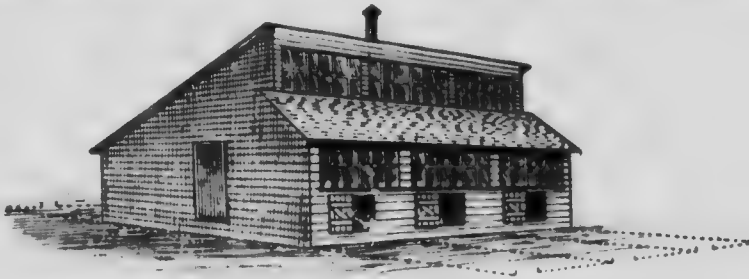
The style of roof shown in section A is one that has met with considerable favour in many parts of America. The two parts of the roof should have the same pitch and be of the same length. The wall on one side should be three or four feet higher than on the other side, so that there may be a drop of three or four feet between the higher and the lower parts of the roof at the centre of the building. Such a building should be built to have the upper window face the south. Windows are indicated by W.W.W. on each side and in the centre of the building in the drop between the parts of the roof. The centre window may be on hinges and could then be manipulated by means of a rope or other appliance to let foul air out. Fresh air may be admitted as per plan outlined under B, or as per plan in diagram, page 24.

A line drawing of such a piggery as the above is shown in illustration, page 31.

Cross-section C is that of a flat roofed building with the light admitted from the top only. The window should have a slight slope toward the south. The best method to ventilate such a building will be the system outlined on page 24.

In diagram D, a plan for a building with a loft is given. This roof and ceiling plan admits of a great deal of light entering the piggery without having the whole ceiling so high as to render the building cold. The upper part of the window being hinged permits of it being worked to act as a ventilator for both inlet and outlet. Windows are indicated by triple lines.

In plan E a single slope roof is shown. Piggeries built on this plan should have pens with a proportionately larger frontage on passage so as to decrease width of piggery. The south or large window should be at least six feet high.



A SMALL PIGGERY.

PART II.—A COMPILATION OF A NUMBER OF EXPERIMENTS IN PIG FEEDING CONDUCTED AT THE CENTRAL EXPERIMENTAL FARM INCLUDING A FEW CARRIED ON AT NAPPAN, N.S., BRANDON, MAN., AND INDIAN HEAD, ASSA.

COMPARISON OF BREEDS AS TO ECONOMY OF GAIN.

Because pigs of some breeds show a tendency to lay on fat rather than produce muscle or lean meat, many farmers suppose that they fatten or mature rapidly and lay on flesh more cheaply. Such is not the case. Many experiments conducted here and elsewhere show very little difference in economy of gains with animals of the different breeds.

The following tables show the quantities of feed consumed per pound of increase in live weight, by swine of different breeds or breeding during different feeding tests.

Table I. shows the quantities of frosted wheat, ground and soaked in cold water for an average period of eighteen hours, consumed by swine of different breeding per pound of increase in live weight. They were fed for a period of twelve weeks.

TABLE I.

No. of Swine.	Breeding.	Date of Birth.	Average of live weight per head.			Feed consumed per lb. of increase.
			1892.	Oct. 3.	Dec. 26.	
			lbs.	lbs.	lbs.	
3 Crossbreds ..	Berkshire sire and Poland-China dam	May 14.	109	210	5.03	
4 Grades	Improved Large Yorkshire sire and Berkshire Grade dam	June 13.	94	186	5.03	
2 Crossbreds ..	Improved Large Yorkshire sire and Berkshire dam ..	May 1.	128	213	5.56	
3 Purebreds ..	Improved Large Yorkshire	Aug. 4.	91	157	5.47	

Table II shows the quantity of a mixture of equal parts by weight of barley and frosted wheat both ground and soaked in cold water for an average period of thirty hours, plus pulped carrots, consumed by swine of different breeding per pound of increase in live weight. They were fed for a period of twelve weeks.

TABLE II.

No. of Swine.	Breeding.	Date of Birth.	Average of live weight per head		Feed consumed per lb. of increase.	
			1892.	Feb. 7 or 14.	May 2 or 9.	Grain. Carrots.
6 Crossbreds	Improved Large Yorkshire sire and Essex dam	Sept. 23.	lbs.	lbs.	lbs.	lbs.
3 Purebreds	Berkshire	" 24.	70	134	3 77	0 76
4 Crossbreds	Improved Large Yorkshire sire and Poland-China dam	Aug. 3.	117	186	4 17	0 76
4 Purebreds	Tamworth	" 30.	119	180	4 42	0 80
4 " "	Improved Large Yorkshire	(2, May 17) (2 Aug. 4)	114	172	4 74	0 86
			180	236	5 83	1 06

Table III. shows the quantity of a mixture composed of equal parts by measure of barley, rye, frosted wheat (all ground) and wheat bran, soaked in cold water for an average period of 8 to 18 hours, consumed per pound of increase in live weight by swine of different breeding. Some of them were fed for a period of fifteen weeks, and some of them for a period of twelve weeks.

TABLE III.

No. of Swine.	Breeding.	Date of Birth.	Average of live weight per head.		Feed consumed per lb. of increase.
			1893.	Aug. 23.	Dec. 6.
			lbs.	lbs.	lbs.
5 Crossbreds	Improved Large Yorkshire sire and Berkshire dam.	June 9.	42	86	3 62
5 " "	Berkshire sire and Improved Large Yorkshire dam.	" 6.	49	108	3 72
5 " "	Essex sire and Improved Large Yorkshire dam.	May 31.	45	98	3 73
2 " "	Berkshire sire and Tamworth dam	" 7.	94	173	1 3
5 " "	Berkshire sire and Poland China dam	Apr. 27.	83	161	1 11
5 " "	Essex sire and Improved Large Yorkshire dam.	May 31.	41	83	4 27
Sept. 6. Nov. 29.					
4 Grades	Tamworth sire and Berkshire grade dam.	July 3.	52	113	3 24
5 Purebreds	Improved Large Yorkshire	June 15.	48	82	3 90

Table IV. shows the quantity of a mixture of equal parts by measure of barley, rye, frosted wheat (all ground) and wheat bran, soaked in cold water for an average period of eighteen hours, plus 3 pounds of skim milk per head per day, consumed per pound of increase in live weight by swine of different breeding. Some of them were fed for a period of 8 weeks and some for a period of 12 weeks.

TABLE IV.

No. of Swine.	Breeding.	Date of Birth.	Average of live weight per head.		Feed consumed per lb. of increase.	
			1893.	Dec. 6.	Meal.	Milk.
			lbs.	lbs.	lbs.	lbs.
Crossbreds..	Improved Large Yorkshire sire, and Berk- shire dam.....	June 9.	86	Jan. 31, 150	2 52	2 56
5 Purebreds..	Improved Large Yorkshire.....	" 15.	82	Feb. 28, 191	2 64	2 31
5 Crossbreds..	Essex sire and Improved Large Yorkshire dam.....	May 31.	96	Jan. 31, 180	2 88	2 32
4 Grades.....	Tamworth sire, and Berkshire grade da- m.....	July 3.	117	" 31, 202	3 10	1 95
5 Crossbreds..	Berkshire sire, and Improved Large York- shire dam.....	June 6.	108	Feb. 28, 223	3 09	2 17
5 " "	Essex sire, and Improved Large Yorkshire dam.....	May 31.	83	" 28, 192	3 23	2 53
2 " "	Berkshire sire, and Tamworth dam.....	" 7.	173	" 28, 225	3 77	2 45

Conclusions.—From these four series of tests it appears that:—

1. The breeding of the swine which gave the largest increase per pound of feed consumed was different in each of the four tests, viz.:

Table I.—Crossbreds, Berkshire sire and Poland China dam; grades, Improved Large Yorkshire and Berkshire grade dam.

Table II.—Crossbreds, Improved Large Yorkshire sire and Essex dam.

Table III.—Grades, Tamworth sire and Berkshire grade dam.

Table IV.—Crossbreds, Improved Large Yorkshire sire and Berkshire dam.

2. The breeding of the swine which gave the least increase per pound of feed consumed was:—

Table I.—Purebreds, Improved Large Yorkshire.

Table II.—Purebreds, Improved Large Yorkshire.

Table III.—Crossbreds, Essex sire and Improved Large Yorkshire dam.

Table IV.—Crossbreds, Berkshire sire and Tamworth dam.

3. There was no constant or appreciable superiority in the breeds and breeding tested in respect to the quantity of feed consumed per pound of increase in live weight.

4. The difference in the thriftiness, or power to increase in live weight per pound of feed consumed, was greater between different animals in the same litter than between breeds or breeding as such in different litters.

5. On the whole, for fattening purposes crossbred swine and grades gave better results than purebreds.

WORK AT OTHER STATIONS.

Some work done along this line at Guelph is well summarized by Prof. G. E. Day, in bulletin 129, from which the following extract is copied:—

'The table given below shows the average amount of meal required for 100 pounds gain, live weight, in the five experiments. In the making up of this table only the meal has been considered. Such food as dairy by-products and green feed, which were fed sometimes, were the same for all breeds, and have been omitted to simplify the comparison.

'The following shows the average amount of meal consumed for 100 pounds gain, live weight, in five experiments:

Berkshire.....	364.45
Yorkshire.....	369.51
Tamworth.....	380.47

Duroc Jersey..	384.23
Chester White..	387.89
Poland China..	391.42

Before any conclusions are drawn from the table given above, a second table will be presented for consideration in connection with it.

Table showing the standing of the breeds for each year, each column being ranked in order of economy of gain for each year of the experiment:—

TABLE V.

1896.	1897.	1898.	1899.	1900.
Berkshire.....	Berkshire.....	Yorkshire.....	Berkshire.....	Berkshire.....
Tamworth.....	Tamworth.....	Berkshire.....	Tamworth.....	Yorkshire.....
Poland China.....	Poland China.....	Duroc Jersey.....	Yorkshire.....	Duroc Jersey.....
Duroc Jersey.....	Chester White.....	Tamworth.....	Chester White.....	Chester White.....
Chester White.....	Yorkshire.....	Chester White.....	Duroc Jersey.....	Tamworth.....
Yorkshire.....	Duroc Jersey.....	Poland China.....	Poland China.....	Poland China.....

In considering these tables we must bear in mind that averages are frequently misleading. For example, in a certain experiment one breed may suffer from some unfavourable circumstance which is in no way related to or influenced by the breeding of the animals; yet this circumstance may seriously affect the average standing of the breed in question.

A study of the last table reveals the fact that there is little or no constancy in the standing of any one breed, except the Berkshires, which certainly make a remarkably good showing. It may be possible that the Berkshires were able to digest and assimilate a larger percentage of their food than were the other breeds, but we believe that at least a large share of their success was due to another cause. All the pigs used in these experiments were purchased at ages varying from six to ten weeks, and it was noted that the Berkshires seemed to adapt themselves to the new conditions and change of food more readily than any of the other breeds, and thus scored an advantage at the commencement of the experiment, which they generally held until the close. We are inclined, therefore, to attribute their high standing to their ability to adapt themselves to changed conditions rather than to their power to digest and assimilate a larger percentage of their food.

In 1896, Mr. A. Mackay, at Indian Head, experimenting with different breeds of swine, says:—

To test the difference in growth between large Yorkshires, Tamworths and cross-bred pigs, two animals from each of these breeds were put into one pen on August 4, and fed all they could eat till November 24, or in all, 111 days.

The weight and age of each lot at the commencement and weight at close of the test will be found below, together with the amount of gain, which shows slightly in favour of the Tamworth breed. No Berkshires were available at the time, or they would have been added to the test.

TABLE VI.

Breed.	Age.		Weight at Start of Test.	Weight at Close of Test.	Gain.
	Months.	Days.	Lbs.	Lbs.	Lbs.
Large Yorkshires.....	4	8	124	404	280
Tamworths.....	3	27	141	456	315
Cross-breeds.....	2	26	96	400	304

METHODS OF WINTERING.

WINTERING SOWS, OUTSIDE VS. INSIDE.

Where much pasturing of pigs is carried on the wintering of the sows and the fall litters is always a problem of considerable difficulty, since the full utilization of pastures requires pigs ready to turn out at an early date in the spring.

During the winter of 1903-04 a number of the brood sows were housed in the small single board cabins used on the pastures in summer. They did well and were healthy, but cost about twenty-five per cent more to maintain in good condition than did their mates housed in the regular brood sow run or house.

RAISING YOUNG PIGS.

A problem that confronts the farmer who wishes to go heavily into bacon production is the raising of young pigs to the age of three or four months, without the help of skim-milk or whey. This difficulty is more particularly noticed in winter or autumn. To gain some information as to the probably best meal mixtures for the purpose, two experiments were tried in January, February and March, 1904. One was conducted outside with pigs housed in small cabins, as mentioned above, and the other inside the regular piggery.

In determining the value of a meal mixture, the items to be considered are the rate of gain and the cost of 100 pounds increase in weight.

WINTERING YOUNG PIGS, OUTSIDE VS. INSIDE.

A study was also made of the comparative economy of feeding fall pigs outside and inside.

Below is a statement of the results secured. There were two lots inside and two lots outside. The lots were from two different litters, some from each being inside and the rest outside.

TABLE VII.
YOUNG PIGS WINTERED INSIDE vs. OUTSIDE.

	Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lots 1 & 3. Lots 2 & 4.	
Location.....	Inside.	Outside.	Inside.	Outside.	Inside.	Outside.
Number of pigs in lot.....	5	4	4	7	9	11
Number of days on feed..... Days.	60	60	60	60	60	60
Description of ration fed..... Lbs.	Shorts 100 Gluten 100	Shorts 100 Gluten 100	Oil meal 100 Shorts 400	Shorts 400 Oil meal 100	Mixed meals.	Mixed mea as inside.
Pounds of mixture required for 100 lbs. gain.....	417	552½	280	502	365½	526
Amount fed in period..... Lbs.	993	1,071	400	1,265	1,393	2,336
Value..... \$	10 67	11 51	4 00	12 65	14 67	24 16
Gain made by lot..... Lbs.	238	192	143	252	381	444
Average gain per pig..... "	48	48	35½	36	42½	40½
Average rate of gain per diem..... "	82	80	6	6	70	68
Cost of 100 lbs. increase in live weight..... "	4 48	6 00	2 80	5 02	3 85	5 42
Health and appearance.....	Good.	Good.	Good.	Good.	Good.	Good.
Weight of lot to start..... Lbs.	496	460	181	331	677	731
Average weight to start..... "	99	160	45½	47	75	66½
Weight of lot at finish..... "	734	592	324	583	1,068	1,175
Average weight at finish..... "	147	148	81	83	117½	107

INSIDE FEEDING.

When similar feeds were fed inside much better results were noted, both the rate of gain per day being slightly increased and the cost of production lowered. The mixture of shorts 4 parts and oil 1 part coming to the fore, as gains were made at a cost of \$2.80 per 100 lbs. gain, and at the rate of 6-10ths pound per pig per day.

TABLE VIII.

RATIONS FOR YOUNG PIGS INSIDE.

	Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lot 5.
Number of pigs in lots.....	5	4	5	4	5
Location.....	Inside.	Inside.	Inside.	Inside.	Inside.
Number of days on feed.....	40	40	60	60	60
Description of ration fed.....	Oil meal 200 Shorts 200 Gluten 200 Oats 200 Skim-milk 4½ lbs. a day	Shorts. Skim-milk.	Shorts 100 Gluten 100	Shorts 400 Oil meal 100	Oats 100 Oil meal 100
Pounds of mixture required for 100 pounds gain..... Lbs.	190 meal, 564 skim-milk.	152 meal, 564 skim-milk.	417	280	322
Amount fed in period..... "	252 meal, 750 milk.	204 meal, 756 milk.	993	400	699
Value..... \$	5.94	2.96	10.67	4.00	8.04
Gain made by lot..... Lbs.	133	134	238	143	217
Average gain per pig..... "	26½	33½	48	35½	44½
Average rate of gain per day..... "	.66	.84	.82	.6	.74
Cost of 100 lbs. increase in live weight..... \$	2.94	2.21	4.48	2.80	3.70
Health and appearance.....	Very good.	Excellent.	Good.	Good.	Good.
Weight of lot to start..... Lbs.	183	122	496	181	379
Average weight to start..... "	36½	30½	99	45½	76
Weight of lot at finish..... "	316	256	734	324	595
Average weight at finish..... "	63	64	147	81	119

OUTSIDE FEEDING.

An examination of the reports of the experiments carried on outside, submitted below, shows that a mixture of shorts 4 parts and oil meal 1 part produced pork for \$5.02 per 100 pounds at the rate of 6-10ths of a pound per day. Shorts and gluten meal, equal parts, produced pork at a more rapid rate, viz., 8-10ths pounds per day, but at a slightly higher cost, viz., \$6 per 100 pounds. The difference may have been due to the difference in the age of the pigs. A mixture of shorts and oil meal, equal parts, gave very poor results, since it cost \$7.93 to produce 100 pounds, live weight, at the rate of 47-100th pounds per pig per day.

TABLE IX.
RATIONS FOR YOUNG PIGS OUTSIDE.

	Lot 3.	Lot 4.	Lot 6.	Lot 7.	Lot 8.	Lot 9.
Number of pigs in lot	4	4	6	7	4	4
Location	Outside.	Outside.	Outside.	Outside.	Outside.	Outside.
No. of days on feed	60	60	60	60	60	60
Description of ration fed.	{ Shorts 100 Gluten 100		Shorts 100 Oil meal 100	Oats 200 Shorts 400 Oil meal 100	Oats 100 Shorts 200	Shorts 400 Oil meal 100 Gluten 100 Skim-milk. 44 lbs. per d
Pounds of meal mixture required for 100 lbs. gain.	552½	721	600	502	600	Meal 281½ Milk 766 Milk 1,134 Meal 417
Amount fed in period. Lbs.	1,071	908	1,080	1,265	1,176	549
Value. \$	11.51	8.88	10.80	12.65	11.76	148
Gain made by lot. Lbs.	192	112	180	252	196	57
Average gain per pig.	48	28	30	36	28	62
Daily rate of gain.	.8	.47	.5	.6	.47	
Cost of 100 lbs. increase in live weight. \$	6.00	7.93	6.00	5.02	5.70	3.82
Health and appearance.	Good.	Good.	Good.	Good.	Fair.	Excellent.
Weight of lot to start. Lbs.	400	155	384	231	556	256
Average weight to start.	100	38.7	64	47	81	64
Weight of lot at finish.	592	267	564	582	762	403
Average weight at finish.	148	66.7	94	83	109	101

FEEDING IN PASTURE AS COMPARED WITH FEEDING IN PENS.

Mr. R. Robertson, at Nappan, experimenting with pigs, writes:—

An experiment carried on in the summer of 1902-03 was repeated this year with pigs of one month old, in two lots of ten each, of various breeds and crosses, each lot consisting of an equal number from each litter and termed lot I. and lot II.—lot I. in pasture and lot II. in pens.

Lot I. were fed an average daily ration of 2 pounds meal, largely shorts, and 4 pounds skim-milk, from July 1 to November 1, and pasture which consisted of clover, rape, hairy or sand vetch, and spring vetch and peas mixed sown on different parts of a field of one acre in extent.

Lot II. were fed the same daily ration in pens.

A portable house was used for shelter. On November 1 the pigs were taken into pens, and fed a ration of 3 pounds meal until December 1.

The results are as follows:—

TABLE X.

Lot I. fed on pasture, July 1 to November 1; fed in pens, November 1 to December 1.

Period.	Weight at Start.	Weight at Finish.	Gain.
	Lbs.	Lbs.	Lbs.
July 1 to November 1.....	170	1,129	959
November 1 to December 1.....	1,129	1,609	480
Total gain, 10 pigs, 153 days.....			1,439

Average daily gain on pasture, July 1 to November 1.....	Lbs.	78
Cost per pound gain, entire period.....	cts.	3 55
Average daily gain in pens, November 1 to December 1....		1.60

TABLE XI.

Lot II. fed in pens, July 1 to December 1, 1904.

Period.	Weight at Start.	Weight at Finish.	Gain.
	Lbs.	Lbs.	Lbs.
July 1 to March 1	185	1,169	984
November 1 to December 1	1,169	1,472	303
Total gain, 10 pigs, 153 days			1,287

	Lbs.
Average daily gain in pens, July 1 to November 1	80
Average daily gain in pens, November 1 to December 1	1.01
Cost per pound gain, entire period	3.94

FEEDING PIGS ON PEASE IN THE FIELD.

In 1904 Mr. S. A. Bedford, at Brandon, writes as follows:—

Field pease give large returns in this province, but the one great obstacle to their general cultivation is the difficulty in harvesting and threshing the crop. With the object of overcoming this difficulty a trial was made of turning a number of pigs into one acre of nearly ripe pease and allowing them to do the harvesting and threshing.

Ten pigs were used for this test. They were all of mixed breeding, and cost on September 3, \$4.75 per hundred pounds. It was found necessary to ring them, otherwise they covered many of the pease in rooting up the soil.

The variety of pea used was Canadian Beauty, sown on one acre of summer-fallow land on May 7. Pigs were turned into the field on September 3, and by October 20 they had all the grain eaten clean.

SUMMARY.

Group of Ten Pigs.

Weight when bought	lbs.	1,393
Value when bought		\$66 16
Weight when sold	lbs.	1 670
Value when sold		\$83 50
Profit on one acre peas fed to pigs		\$17 34

EXPERIMENTS IN FEEDING SKIM-MILK.

The value of skim-milk as a feed for pork production has always been well known, and the following experiments were devised for the purpose of giving some exact data which might be used as a guide to the feeder rather than for the purpose of settling some disputed question of establishing some doubtful feed on better grounds. Some of the experiments summarized in the following table were conducted with the sole purpose of determining the value of this by-product, while others have been introduced as illustrating to a greater or less extent the value of this feed. The very great value of this substance must not be measured by its chemical composition solely; but its peculiar, apparently stimulating action upon the growth of animals must be considered. The following data are accordingly submitted:—

TABLE XII.

Experiment	Feed	How Prepared.	No. of Swine.	Average weight at start.	Average weight at finish.	Average net gain.	Number of days fed.	Average daily gain.	Average amount feed eaten.	Average amount feed for 1 lb. gain.
				Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.
1	Meal.....	Soaked 30 hours.....	3	117	230	113	112	1 00	483	4 27
2	Meal (half quantity fed in experiment 1). Skim-milk.....	Soaked 30 hours.....	4	103	246	143	112	1 27	181	1 26
									3,631	25 39
3	Wheat shorts..... Skim milk.....	Soaked 30 hours.....	5	179	261	82	56	1 46	509	3 80
									536	4 10
4	Meal: pease, wheat and rye.	Ground and soaked 18 hrs.	2	123	196	73	56	1 30	250	3 43
5	Meal, as in 4 (but only $\frac{3}{4}$ amount). Skim milk.....	Soaked 18 hours.....	2	120	206	86	56	1 54	188	2 17
									960	11 10
6	Meal, as in 4 (but only $\frac{1}{2}$ amount). Skim milk.....	Soaked 18 hours.....	2	116	202	86	56	1 54	125	1 45
									1,332	15 49
7	Corn.....	Ground and soaked 30 hrs.	4	74	172	98	112	87	408	4 16
8	Corn..... Skim milk.....	Whole, soaked 54 hours..	3	72	190	118	91	1 30	343	2 90
									273	2 31
9	Pease..... Skim milk.....	Whole, soaked 54 hours..	4	100	207	107	84	1 27	356	3 33
									252	2 35
10	Barley.....	Ground, soaked 54 hours..	4	73	184	111	112	1 00	483	4 35
11	Barley..... Skim milk.....	Whole, soaked 54 hours..	4	90	190	100	84	1 19	364	3 64
									252	2 52
12	Pease, barley and rye..	Whole, soaked 48 hours..	5	69	156	87	119	73	386	4 45
13	Pease, barley and rye.. Skim milk.....	Whole, soaked 48 hours..	5	69	204	135	119	1 13	330	2 46
									1,869	13 92
14	Pease, barley and rye..	Ground and soaked 12 hrs.	5	69	173	104	119	87	455	4 36
15	Pease, barley and rye.. Skim milk.....	Ground and soaked.....	4	76	210	134	119	1 12	464	3 46
									645	4 81

CONCLUSIONS

From these tests to gain information as to the feeding value of skim milk, it appears that:—

1. When swine were fed with meal, barley, rye and wheat alone 4·27 pounds were required to give one-pound gain, but when swine were fed upon similar meal, half the quantity being given, and all the milk they could consume, only 1·26 pounds of meal were required for one-pound gain, and 25·39 pounds skim-milk. One pound of meal would thus be worth 8·43 pounds milk.

2. A mixture of pease, wheat and rye gave one pound pork for each 3·43 pounds fed. (Exp. 4.) For comparison, a similar number of swine (Exp. 5) were given three-quarters the quantity of the same meal and all the skim-milk they would drink. It was then found that 2·17 pounds meal and 11·10 pounds skim milk gave one pound increase in weight. According to these data skim-milk may be said to bear the relation of 8·82 pounds to one of meal.

3. In Exps. 7 and 8 the use of skim-milk with corn is exemplified. It will be observed that in the one case the corn was whole, while it was ground in the other. The longer period for which the whole corn was soaked in the one case may be expected, however, to exert as great an influence as the grinding in the other upon the portion of nutrients available. The data obtained from these experiments would indicate that 1.83 pounds skim-milk were equivalent to one-pound of corn. While this is not exactly in accordance with the results of other experiments here it serves to emphasize the great value of skim-milk as a supplementary food, and as a supplement to no other grain does its effect seem so marked as when used with corn.

4. In Experiments 10 and 11, with barley and milk, the same conditions obtain as are discussed in the preceding paragraph. It will be observed that while of barley fed alone 4.35 pounds were required to produce one pound of pork, only 3.64 pounds were required for the same effect when fed with 2.52 pounds of milk. Here also the feeding value of skim-milk seems very much greater than most work along this line would indicate.

5. In Experiments 12 and 13 the use of milk with a mixture of pease, barley and rye fed whole, as compared with the same mixture fed alone, is illustrated. The mixture seems to bear the relation of 1 to 6.99 pounds of milk.

6. In Experiments 14 and 15 a meal composed of equal parts of ground pease, barley and rye was fed in the one case without milk when 4.36 pounds were required to produce one pound of pork, and in the other case with all the skim-milk the pigs would consume in addition to the grain ration when 3.46 pounds meal and 4.81 pounds skim-milk produced one pound pork. Skim-milk, according to this experiment, would be worth about one-fifth (100:534) as much as an equal weight of the meal.

7. In addition to the above work, a summary of some other work is submitted below.

From tests made in 1892, 1893 and 1894 with 48 swine, it appears that when a small quantity (about three pounds per head per day) of skim-milk was fed, a less quantity of it was equal to one pound of the grain in the feed consumed per pound of increase in live weight, than when a large quantity (about 15 pounds per head per day) was fed.

The results are shown in the following table:—

TABLE XIII.

Number of Swine in Test.	Skim-milk consumed per head per day.	
	lbs.	
4	2	1 pound corn equal to 1.83 pounds skim-milk.
31	3	1 pound mixed grain equal to 3.23 pounds skim-milk.
4	5.4	1 " " " 5.38 " "
4	13.6	1 " frosted wheat " 7.91 " "
5	15.7	1 " mixed grain " 7.34 " "
2	17.1	1 " " " 8.82 " "
2	23.7	1 " " " 7.76 " "

General Conclusions.—From these tests and from our experience in feeding young pigs, it appears that:—

(1.) For the fattening of swine weighing on the average over 100 pounds each, live weight, it is economical to give an allowance of skim-milk not exceeding five pounds per head per day.

(2.) Skim-milk gives the best returns for the amount fed when it constitutes a comparatively small part of the total food fed.

(3.) Skim-milk may, generally speaking, be considered to be worth from one-sixth to one-fifth as much as mixed grain.

FEEDING SKIM-MILK AT NAPPAN.

With a view to determine the value obtainable for skim-milk when fed to pigs under existing markets for feed and products, three lots of pigs were fed during the year 1902.

Lot 1 were fed an average of 30 pounds skim-milk per pig per day, and lots 2 and 3 an average of 25 pounds skim-milk per pig per day. A daily average of two pounds wheat shorts were also fed to each pig. Lots 1 and 3 were valued at \$2 each pig, and lot 2 at \$3 each at the beginning of the test. The results were as follows:—

TABLE XIV.

SKIM-MILK TEST.

L. No.	Breeding	No. Swine	Age.	Weight at Start.	No. of Days Fed.	Weight at Finish.	Dressed Weight.	Value.	First Cost.	Cost Meal Feed.	Value per 100 lbs. Milk.
			months	Lbs.		Lbs.	Lbs.	\$ cts.	\$ cts.	\$ cts.	Cts.
1	Berkshire.	3	1	77	110	435	369	22 14	6 00	6 60	14 45
2	"	3	2	216	125	369	558	30 69	9 00	7 50	15 13
3	Yorkshire	3	1	132	165	900	720	43 20	8 00	13 20	17 77

WHOLE VS. GROUND GRAIN.

EXPERIMENTS CONTRASTING THE VALUE OF WHOLE GRAIN WITH SIMILAR GRAIN WHEN GROUND, AS A PORK PRODUCER.

It is generally conceded that there is more or less waste when grain is fed whole to swine. Many feeders maintain, however, that the gains are practically the same from equal weights of grain whether fed whole or ground. To get some data on this point, a number of experiments have been carried on here.

The following gives a summary of the results with ten groups of pigs fed at different times and with different feeds:—

TABLE XV.

Experiment.	Feed.	How Prepared.	No. of Swine.	Average weight to start.	Average weight at finish.	Average net gain.	No. of days fed.	Average daily gain.	Average amount feed eaten.	Average amount feed for 1 lb. gain.
				lbs.	lbs.	lbs.		lbs.	lbs.	lbs.
1	Pease, barley and rye	Whole, soaked 48 hours	5	69	156	87	119	73	386	4 45
2	" " "	Ground, soaked 12 hours	5	69	173	104	119	87	455	4 36
3	" " "	Whole, soaked 48 hours	5	69	204	135	119	113	330	2 46
	Skim-milk								1869	13 92
4	Pease, barley and rye	Ground, soaked 12 hours	4	76	210	134	119	112	464	3 40
	Skim-milk								645	4 81
5	Oats, barley, pease and $\frac{1}{2}$ part bran	Whole, dry	4	67	175	108	119	90	441	4 08
6	" " "	Ground, dry	4	69	195	126	119	106	450	3 56
7	" " "	Whole, soaked 30 hours	4	66	171	105	119	88	409	3 88
8	" " "	Ground, soaked 30 hours	4	66	190	124	119	104	467	3 76
9	Oats, pease and barley	Whole, dry	4	103	185	82	76	108	307	3 60
10	" " "	Ground, dry	4	101	190	89	76	117	307	3 43

A study of the above table would seem to show that:—

1. When, pease, barley and rye were fed whole, 400 pounds more of the mixture was required to produce a pound of pork than when fed ground. This is a gain of two per cent.

2. Lots 3 and 4 were given in each case all the skim-milk they would drink. While no exact feeding value can be attached to the skim-milk, yet a considerably greater gain is indicated from grinding the feed than in lots 1 and 2.

3. In lots 5 and 6, where a ration of oats, barley and straw was fed, first with the grain part unground and second with the grain part ground a large gain is indicated, viz., 20 per cent.

4. In lots 7 and 8, where a similar ration to that in lots 5 and 6 was fed with the difference that in lots 5 and 6 it was fed dry, and in lots 7 and 8 it was fed soaked, a smaller gain of about 3 per cent is shown in favour of the ground feed.

5. In lots 9 and 10 a mixture of oats, pease and barley is fed whole, and contrasted with a similar mixture when fed ground. A gain of almost 4 per cent is shown in favour of the ground feed.

6. While the results vary considerably, it will be observed that in every case a gain is noticeable where ground feed is used rather than whole feed. It is quite safe to say that a gain of from 5 to 10 per cent may be looked for when ground grain rather than unground is fed.

In some experiments conducted here with whole grain an effort was made to ascertain the per cent of grain that escaped digestion when it was fed whole. The excrement was collected for 24 hours after the animals had been on a fixed ration of one variety of grain for some weeks, and the following results obtained:

(a) In case of whole oats where 14 pounds feed was fed 2 lbs. 6 oz. of undigested grain, or 21·6 per cent of the whole amount, was found in the excrement. One-tenth of this germinated.

(b) In the case of whole barley, where 17 pounds was fed, 21 lbs. 2 oz. or 124 per cent of the whole amount was found in the excrement. None of this would germinate.

(c) In the case of whole pease, where 17 pounds was fed, 2 oz. only, or about $\frac{1}{8}$ of 1 per cent of the whole amount was found in the excrement. None of this would germinate.

(d) In the case of whole corn, where 11 pounds was fed, 8 oz., or nearly 5 per cent of the whole amount, was found in the excrement. About one twelfth of this germinated.

(e) In the case of unground mixed grain (oats, pease and barley), where 11 pounds of grain was fed 10 oz., or 5·7 per cent of the whole amount, was found in the excrement. About one-fiftieth (oats) of this germinated.

COOKED vs. RAW.

EXPERIMENTS TO DETERMINE THE VALUE OF STEAMED OR COOKED FEED, FED WARM, AS CONTRASTED WITH RAW FEED, FED COLD, INCLUDING AN EXPERIMENT WITH PEA ENSILAGE.

The following report is taken with slight changes from the report for 1891:—

The object of this experiment was twofold: (1) to discover the difference, if any, in the quantity of grain required to produce every pound of increase of the live weight of the swine, when fed, steamed and warmed in the one case, and when fed raw and cold in the other case; (2) to obtain a record of the comparative quantities of grain required to produce every pound of increase in the live weight of the swine during the different stages of the feeding period. The grains fed were ground peas, barley and rye, equal parts.

The mixture of grain was fed wet in both cases. Cold water was given to drink. A mixture of salt and wood ashes was kept in a box on the floor of each pen, where the pigs had access to it at will. In the following table the feeding period has been

arranged into five periods of four weeks each and one period of three weeks. It shows the gain in weight and the quantities of grain consumed.

TABLE XVI.

	9th December.	5th January.	2nd February.	2nd March.	30th March.	25th April.	18th May.	Totals.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
<i>Pen 1—Four Swine.</i>								
Fed on a mixture of ground pease, barley and rye, fed steamed and warmed :								
Live weight.....	302	407	614	808	917	974½	745*	*Three swine only.
Gain in weight.....		105	207	194	109	57½	39	702½, gain in weight.
Feed consumed.....		348	639	796	545	406	256	2,928, grain consumed.
Feed consumed per lb. of gain in live weight.....								4·16 lbs. grain.
<i>Pen 2 Four Swine.</i>								
Fed on a mixture of ground pease, barley and rye, fed raw and cold :								
Live weight.....	308	412½	597	723	781½	830½	872	
Gain in weight.....		105½	183½	126	58½	49	41½	564, gain in weight.
Feed consumed.....		348	543	558	413½	278½	237	2,398, grain consumed.
Feed consumed per lb. of gain in live weight.....								4·25 lbs. grain.
<i>Pens 1 and 2.</i>								
Average weight of pigs.....	76	102½	151	191	212	225½	231	
Average feed consumed per lb. of gain in live weight.....		3·31	3·07	4·04	5·73	6·45	6·93	
Percentage of increase in feed consumed per lb. of gain in live weight.....				31%	86%	110%	125%	

In this experiment the object was to discover the value, if any, of pea ensilage for the feeding and fattening of swine.

Records were also kept to ascertain the comparative quantities of feed required to produce every pound of increase in the live weight of the swine during the different stages of the feeding period.

The pea ensilage was prepared by harvesting the crop when the earliest pods were filled and before the peas became hard. The vines were green and succulent. The ensilage was well preserved. The pigs in lot 3 were fed an allowance of grain, a mixture of equal parts of ground peas, barley and rye, but not as much as they would have eaten readily. They were fed also a quantity of pea ensilage. The pigs in lot 4 were fed upon pea ensilage only. In both cases the pigs refused to eat more than a small portion of whatever quantity of pea ensilage was offered to them. The remainder was nosed over, pushed about and tramped on. When what was left uneaten was weighed out of the pens, it was very wet.

Both lots of pigs were allowed cold water to drink, and a mixture of salt and ashes was accessible to the pigs in both cases. The pea ensilage did not seem to have any feeding value to the pigs which received an allowance of grain; and the pigs in lot 4 steadily decreased in weight for nine weeks when the feeding of ensilage was ended.

The following table contains the details of the weights of pigs, feed consumed, and rate of gain in live weight:—

TABLE XVII.

	24th December.	5th January.	2nd February.	2nd March.	30th March.	27th April.	18th May.	Totals.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
<i>Lot 3—Four swine.</i>								
Fed on a mixture of ground pease, barley and rye, fed, steamed and warmed, and pea ensilage—								
Live weight	254	267	414	*379	442	494	548	*Three swine only.
Gain in weight		13	147	74	63	52	54	463, gain in weight.
Feed consumed. (Grain.....)		63	474	335	287	260	243	1,662, grain consumed.
Pea ensilage. (Pea ensilage.....)		112½	682	345				
Pea ensilage left uneaten (wet).....		100	625	319				
Grain consumed per lb. of gain in live weight								4·12, grain.
<i>Lot 4—Four swine.</i>								
Fed on pea ensilage only un- til 2nd March								
Live weight	256	237	223	206				
Loss in weight		19	14	18				51, loss in weight.
Pea ensilage fed.....		235	1401	2127				
Pea ensilage left uneaten (wet).....		150	938	1409				
After 2nd March, fed on a mix- ture of ground pease, barley and rye, fed raw and cold								
Live weight				206	395½	512½	571	
Gain in weight					190½	117	58½	366, gain in weight.
Feed consumed					143	383	327	1,158, grain consumed.
Feed consumed per lb. of gain in live weight					2·32	3·31	5·59	3·16, grain.
<i>Lots 3 and 4.</i>								
Average feed consumed per lb. of gain in live weight		4·84	3·22	4·52	2·88	3·83	5·06	

Lots 5 and 6 were fed similarly to lots 3 and 4, save that sugar beets were substituted for pea ensilage.

TABLE XVIII.

Shows the weights of the swine, the gains in weight, and the quantities of feed consumed.

	9th December.	5th January.	2nd February.	2nd March.	30th March.	27th April.	18th May.	Totals.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
<i>Lot 5—Four Swine.</i>								
Fed on a mixture of ground pease, barley and rye, fed steamed and warmed, and sugar beets								
Live weight	187 258	425	581	669	744½	812		
Gain in weight.	71	167	156	88	75½	67½	625, gain in weight.	
Feed consumed.	{ Grain. 339 Sugar beets. 44½	{ 412 330	{ 540 313	{ 475 320	{ 360 306	{ 282 224	2,411, grain consumed. 1,598, sugar beets consumed.	
Feed consumed per lb. of gain in weight.							{ 3 86, grain. 2 46, sugar beets.	
<i>Lot 6—Four Swine.</i>								
Fed on a mixture of ground pease, barley and rye, fed raw and cold, and sugar beets								
Live weight	201 272	415	547	692	731	772		
Gain in weight	71	143	132	145	30	41	571, gain in weight.	
Feed consumed.	{ Grain. 225 Sugar beets. 60	{ 396 320	{ 503 307	{ 458 310	{ 371 322	{ 270 244	2,223, grain consumed. 1,503, sugar beets consumed.	
Feed consumed per lb. of gain in live weight.							{ 3 89, grain. 2 73, sugar beets.	
<i>Lots 5 and 6.</i>								
Average feed consumed per lb. of gain in live weight.	{ Grain. 3 93 Sugar beets. 0 72	{ 2 61 2 10	{ 3 62 2 15	{ 4 00 2 73	{ 5 04 5 52	{ 4 33 5 11		
Percentage of increase in feed consumed per lb. of gain in live weight.							21 per ct. 90 per ct.	
1 lb. grain equal to 5 lbs. sugar beets.								

The following table shows the quantities of feed consumed per pound of gain, live weight, during each of the six feeding periods. The duration of each period was four weeks, with the exception of the first period, for pens 4 and 5, and the last period for all the pens, which was three weeks. The grain fed in each case was a mixture of equal parts of ground pease, barley and rye. No notice is taken in this table of the pea ensilage fed to lots 4 and 5, as it did not appear to have any appreciable feeding value in these cases:—

TABLE XIX.

Pounds of feed consumed per pound of gain in the live weight of swine.

Feeding Periods.	Lot 1, four swine : grain, fed steamed and warm.	Lot 2, four swine : grain, fed raw and cold.	Lot 3, four swine : grain, fed steamed and warm.	Lot 4, four swine : grain, fed raw and cold.	Lot 5, four swine : grain, fed steamed and warm, and sugar beets.		Lot 6, four swine : grain, fed raw and cold and sugar beets.	
	Grain.	Sugar Beets.	Grain.	Sugar Beets.	Grain.	Sugar Beets.	Grain.	Sugar Beets.
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
First.....	3.31	3.30	4.84		4.69	0.61	3.17	0.84
Second.....	3.07	3.07	3.22		2.46	2.00	2.76	2.23
Third.....	3.79	4.43	4.52		3.46	2.00	3.81	2.32
Fourth.....	5.00	7.07	4.55	2.32	5.40	3.63	3.15	2.13
Fifth.....	7.06	5.68	5.00	3.31	4.88	4.08	9.51	8.25
Sixth.....	8.53	5.71	4.50	5.59	4.17	3.31	6.68	6.00
Average.....	4.16	4.25	4.12	3.16	3.86	2.46	3.89	2.73

Conclusions.—The teaching of these sets of experiments is to the effect that:—

(1.) There is no appreciable difference in the number of pounds of grain required to produce every pound of increase in the live weight of swine, when fed steamed and warm, as against raw and cold.

(2.) On the average there is a gradual increase in the quantity of feed consumed, for every pound of gain in live weight of swine, after the second month of their feeding period and after the average live weight exceeds 100 pounds.

(3.) It is most economical to market swine for slaughtering when they weigh from 180 to 200 pounds alive.

(4.) The largest consumption of feed per day by swine is at or near the period of their feeding when the number of pounds of feed consumed, per pound of increase in weight, is lowest:—

(5.) For the increase of weight by 3,231½ pounds in 24 swine, 4:14 pounds of a mixture of ground pease, barley and rye were required for every pound of increase in live weight.

SOAKED VS. DRY.

EXPERIMENTS TO DETERMINE THE VALUE OF SOAKED FEED AS CONTRASTED WITH SIMILAR FEEDS FED DRY.

It will be seen by referring to page 26 that experiments with cooked feed (grains) would indicate that the increased returns from cooked feed were not sufficient to pay for the extra work and expenditure. The nearest approach to cooking at practically no expense is soaking the food, and the following experiments were carried on along this line. A number of other experiments include some data on this point, but they are so complex as to render their consideration under this head inadvisable.

TABLE XX.

Experiment.	Feed.	How Prepared.	No. of Swine.	Average weight to start.	Average weight to end.	Average net gain.	No. of days fed.	Average daily gain.	Average amount feed consumed.	Average amount feed for 1 lb. gain.
				lbs.	lbs.	lbs.		lbs.	lbs.	lbs.
1	Pease, barley and rye.	Whole and soaked 30 hours.	4	66	171	105	119	88	467	5 1/2
2	"	Whole, dry.	4	67	173	106	119	90	441	4 9/10
3	"	Ground, soaked 30 hours.	4	66	190	124	119	1 1/4	407	3 1/2
4	"	Ground, dry.	4	69	195	126	119	1 1/8	409	3 3/4

It will be observed that in lots 1 and 2 where whole grain was fed, that a considerable saving was apparently wrought in feed by soaking the grain. This is about 10 per cent of the food fed lot 2. In lots 3 and 4 it will be observed that ground grain was fed dry and compared with ground grain soaked. The data here would seem to point to a loss from soaking meal. While this may not be the actual case, yet it is probable that the result from soaking meal may not be so marked as from soaking whole grain. A study of some other experimental work not submitted under this head will also indicate this.

BOILED WHEAT VS. SOAKED WHEAT.

In 1894 Mr. A. Mackay, at Indian Head, says:—

During last winter a test was made between feeding pigs on soaked wheat and on boiled wheat, resulting in favour of soaked wheat.

Two pens of four pigs each (a mixed lot) were put up on December 6, and fed until April 6. One pen was fed on wheat soaked for 24 hours and the other on boiled wheat. Following is the result in detail:

Pen No. 1—Soaked.—Weight: Dec., 317 lbs.; Jan., 443 lbs.; Feb., 536 lbs.; Mar., 664 lbs.; April, 784 lbs. Gain, 467 lbs.

Pen No. 2—Boiled.—Weight: Dec., 275 1/2 lbs.; Jan., 374 lbs.; Feb., 447 lbs.; Mar., 517 lbs.; April 627 lbs. Gain, 351 1/2 lbs.

The pigs in pen No. 1 consumed 2,160 pounds wheat; the pigs in pen No. 2 consumed 2,100 pounds wheat.

Therefore, in this experiment it took 4 1/2 pounds soaked wheat to make one pound of pork, and 6 pounds of boiled wheat to make the same quantity.

Pork at 6 cents per pound would make the wheat consumed in pen No. 1 worth 75 cents, and in pen No. 2 worth 60 cents per bushel.

FROZEN WHEAT EXPERIMENTS.

The unsaleable character of some of the wheat which has been considerably more or less affected by frost in some parts of Manitoba and the Territories led to some experiments being carried on to ascertain the approximate value of this injured grain as a feed for swine. It was fed alone, ground and once and twice soaked in water. It was also fed in conjunction with other cereal and along with shiping meal.

The following table gives in condensed form a summary of this series of experiments:—

TABLE XXI.

Experiment.	Feed.	How prepared.	No. of Swine.	Average weight at start.	Average weight at finish.	Average net gain.	Number of days fed.	Average daily gain.	Average amount of feed eaten.	Average amount feed for 1 lb gain.
				lbs.	lbs.	lbs.		lbs.	lbs.	lbs.
1	Wheat	Ground and soaked 12 hrs.	4	185	275	90	77	1 17	479	5 30
2	Wheat	Whole soaked 42 hrs.	4	186	273	86	77	1 11	570	6 59
3	Wheat, barley and pease.	Whole, soaked 42 hrs.	4	187	278	92	77	1 19	557	6 07
4	Wheat	Ground and soaked 12 hrs.	5	61	165	104	120	0 87	441	4 23
5	Wheat Skim-milk	Ground and soaked 12 hrs.	4	104	192	88	56	1 57	233 1011	2 65 12 51
6	Wheat	Ground and soaked 18 hrs.	12	103	187	84	84	1 00	442	5 26
7	Wheat and barley Carrots	Ground and soaked 30 hrs.	21	117	179	62	84	0 73	326 53	4 45 0 85
8	Barley, rye, wheat and bran	Ground and soaked 12 hrs.	36	54	108	54	105	0 51	207	3 85
9	Barley, rye, wheat and bran Skim-milk	Ground and soaked 12 hrs.	31	108	191	83	83	1 00	268 250	3 23 3 00

In 1892, Mr. A. Mackay, at Indian Head, experimenting with frozen wheat as a feed for pigs, says:—

Two large sows, the only pigs available, were shut up on August 22, in an open pen, after being weighed, and fed for two months on frozen wheat soaked in water for twenty-four hours before being fed. The wheat was fed whole.

The pigs were weighed on October 22, and found to have gained 172 pounds; the weights being on August 22, 900 pounds, and October 22, 1,072 pounds.

The price of pork at Indian Head on October 22 was 7 cents per pound. The value of gain in weight would therefore be \$12.04.

Nine hundred and sixty pounds, or 16 bushels of wheat were fed in the two months; therefore the value of frozen wheat in pork would in this western country, on the basis of this experiment, be about 75 cents per bushel.

On October 22 the feed was changed, and ground instead of whole wheat was fed, the wheat being wet at times of feeding. On December 2 the pigs were weighed, and found to have gained 50 pounds, having eaten 510 pounds of ground wheat; making price of pork \$3.50 and value of grain 41½ cents per bushel.

The difference in gain of pork for amount of wheat eaten may be accounted for partly by the cold weather and partly by the weight and age of the animals.

In above experiments the animals were not in a comfortable house, but exposed to the weather, as the majority of North-west pigs are when fattening, and the experiment may show farmers what may be gained by feeding frozen wheat instead of selling it.

Summary.—It took on an average 6 pounds 1 ounce of wheat during the four months to make 1 pound of pork. Average return per bushel of wheat consumed, 49 cents.

In 1893, Mr. S. A. Bedford, at Brandon, experimenting with frozen wheat as a feed for pigs, says:—

The Berkshire grade pigs were selected for this experiment. They were purchased at five cents per pound, live weight, and sold at the same rate; their combined live weight when the test began, December 7, was 180 pounds. They were fed three times a day all the chopped No. 3 or badly frozen wheat they would eat, clean, mixed with cold water at the time of feeding, the building being too cold to admit of soaking the food for any length of time before using.

The accompanying table will show that this wheat, although badly injured, and fed under unfavourable conditions, realized in its value in pork 49 cents per bushel. The market value of such wheat during the winter of 1891-92 was about 30 cents per bushel, and it would not realize 20 cents this winter.

TABLE XXII.

	Amount of wheat consumed each month by the two swine.	Gain in pounds of pork each month.	Return per bushel of wheat fed.	Pounds of wheat consumed for one pound of pork.	Weight of the swine at end of month.
	Lbs.	Lbs.	Cts.	Lbs. oz.	Lbs.
First month.....	330	67	60	4 14	247
Second ".....	319	45	42	7 1	292
Third ".....	294	55	56	5 5	347
Fourth ".....	313	39	37	8 0	386

VALUES OF GRAINS.

WHEAT ALONE AS COMPARED WITH MIXED GRAIN FOR FATTENING SWINE.

In 1896, Mr. S. A. Bedford, at Brandon, says:—

Many farmers think that wheat alone is neither a safe nor economical feed for swine; to gain information on this point, six cross-bred pigs about three months old and all of one litter were divided into two groups as nearly equal as possible.

In No. 1 pen the pigs were fed on ground wheat alone, soaked; the feed of those in pen No. 2 was a mixture of one-half wheat (by weight), one-quarter barley, and one-quarter oats, all ground and soaked.

Weights.

The three pigs in pen No. 1 consumed 1,606 pounds wheat or $4\frac{1}{2}$ pounds of wheat to produce one pound (live weight) of pork.

Those in pen No. 2 consumed 1,722 pounds mixed grain or $5\frac{1}{2}$ pounds of grain to produce one pound of pork.

If the value of the manure be considered as an equivalent for the labour and attendance, pork at 4c. per pound live weight would make the wheat consumed in pen No. 1 worth 88 cents per hundred pounds, and in pen No. 2 the mixed grain would be worth 72 cents per hundred pounds.

TEST OF WHEAT vs. BARLEY AND WHEAT.

In 1894, Mr. A. Mackay, at Indian Head, says:—

In this test 10 improved large Yorkshires were divided into two pens of five pigs each, as nearly equal in weight as it was possible to get them, there being only five pounds difference between the two lots.

One pen was fed on soaked wheat and the other on soaked wheat and barley mixed. The test commenced on September 1, and on November 1 the pigs in pen No. 1, fed on wheat alone, had made one pound of pork for every 8½ pounds wheat used; while pen No. 2, fed on wheat and barley, made one pound of pork for each six pounds grain eaten.

The ten pigs used were born on December 28, 1893, and January 3, 1894, and on account, no doubt, of the extreme cold experienced early in their existence, were small for their age when the test commenced. This may account for the large quantity of grain consumed in comparison with amount of pork made.

Following is test in detail:—

Pen No. 1—Fed on Soaked Wheat.—Weight : Sept. 1, 618 lbs.; Oct. 1, 751 lbs.; Nov. 1, 820 lbs. Gain, 202 lbs.

Pen No. 2—Fed on Soaked Wheat and Barley.—Weight : Sept. 1, 623 lbs.; Oct. 1, 778 lbs.; Nov. 1, 898 lbs. Gain, 275 lbs.

Pen No. 1 consumed 1,757 pounds wheat; made 202 pounds pork, or 8½ pounds feed to one pound of pork.

Pen No. 2 consumed 1,668 pounds wheat and barley; made 275 pounds of pork, or six pounds feed to one pound of pork

FEEDING BARLEY TO SWINE.

In 1893, Mr. S. A. Bedford, at Brandon, says:—

The two pigs selected for this test were grade Berkshires, their combined weight at the commencement of the test, December 28, was 117 pounds. These were also purchased at 5c. per pound live weight, and sold at the same rate.

The barley was fed three times a day, chopped and mixed with water at the time of feeding. No more was fed than would be eaten up clean at each meal.

The following results show that the barley fed in this experiment realized in pork 50 cents per bushel; farmers at that time were selling same grade of barley on the market at an average of 25 cents per bushel, a difference of 100 per cent in favour of feeding it.

TABLE XXIII.

	Amount of barley consumed each month by the two swine.	Gain in pounds of pork each month.	Return per bushel of barley fed.	Pounds of barley consumed for one pound of pork.	Weight of swine at the end of month.
	Lbs.	Lbs.	Cts.	Lbs. oz.	Lbs.
First month	288	83	69	3 7	200
Second "	335	71	50	4 11	271
Third "	370	65	42	5 11	336
Fourth "	341	62	43	5 8	398

Summary.—It took an average of 4 pounds 11 ounces of barley during the four months to make 1 pound of pork. Average return per bushel of barley fed, 50 cents.

SPELTZ (EMMER) COMPARED WITH MIXED GRAIN.

In 1903, Mr. S. A. Bedford, at Brandon, fed three lots of four pigs each, Yorkshire and Berkshire, one lot on speltz and the other lot on a ration composed of one-fifth oats, two-fifths wheat screenings and two-fifths barley; all feed ground.

Both kinds of feed were valued at 75 cents per hundred pounds. Reports have been received of injury to young pigs from feeding speltz, but no difficulty was experienced from this cause here.

At the close of the test the pigs were sold at \$5.25 per hundred pounds, live weight.

Ration fed.

Amount and value of food consumed during the fattening term of 81 days from January 15 to April 9, 1903:—

TABLE XXIV.

	Grain fed.	Value of Feed.
	Lbs.	\$ cts.
Pen 1, fed speltz	1,525	11 43
Pen 2, fed mixed grain	1,550	11 62

Summary.

	Weight when bought.	Value when bought.	Weight when sold.	Value when sold.	Value of food.	Profit on each pen.
	Lbs.	\$ cts.	Lbs.	\$ cts.	\$ cts.	\$ cts.
Pen 1, fed speltz	432	22 68	821	43 10	11 43	8 99
Pen 2, fed mixed grain	402	21 10	800	42 47	11 62	9 75

EXPERIMENT WITH LAMB'S QUARTER SEED AS PIG FEED AT BRANDON.

This test was made to ascertain whether a ration composed partly of lamb's quarter seed, *Chenopodium album*, had any advantage over a pure grain ration.

The lamb's quarter seed was boiled, and then after being well mixed with the chopped grain was fed wet. The grain was a mixture composed of one-half oats and quarter each of barley and wheat screenings.

The four pigs used for this test were Tamworth crosses. They were fed 76 days, and sold at \$5.50 per hundred pounds, live weight.

From the result of this experiment it would appear that lamb's quarter seed has a limited value as food for pigs. The annual report of the Experimental Farms for 1899, page 147, contains an analysis of this seed.

Ration fed.

Amount and value of food consumed by each pen during the 76 days of the test. The grain is valued at 75 cents per hundred pounds:—

TABLE XXV.

	Lamb's Quarter Seed.	Gain.	Value of feed.
	Lbs.		\$ cts.
Pen 1, fed Lamb's Quarter Seed.....	216	950	7 12
Pen 2, without " ".....		1,125	8 43

Summary.

	Weight when bought.	Value when bought.	Weight when sold.	Value when sold.	Value of food.	Profit per pair.
	Lbs.	\$ cts.	Lbs.	\$ cts.	\$ cts.	\$ cts.
Pen 1, fed Lamb's Quarter Seed.....	337	18 53	558	30 60	7 12	5 94
Pen 2, without " ".....	337	18 53	567	31 18	8 43	4 23

FURTHER EXPERIMENTS WITH DIFFERENT KINDS OF GRAIN FED IN DIFFERENT WAYS.

A large number of experiments have been conducted with the view of determining the relative and actual values of some of the feeding stuffs available to the average feeder. No positive values may be assigned to any food as a pork producer, but the average of a large number of experiments, some of them involving a good many animals of different weights and breeding, may be taken as a fairly good indication of the values of the grains or feeds tested.

To economize space, as many results as possible have been placed in the subjoined table.

The numbers are prefixed for reference merely.

All wheat fed was more or less injured by frost. It will be observed that the wheat when fed whole and soaked gave rather poorer results than when fed ground and soaked. The comparatively large amount of wheat required for a pound of increase in experiments 1, 2 and 3 exemplifies very clearly the disadvantage of feeding swine after a weight of 175 to 200 pounds has been attained. This is seen very clearly when we compare lots 2 and 3 with lots 4 and 8. In lot 2 where swine weighing 186 pounds to begin with were fed, an average of 6.59 pounds was required to produce 1 pound of pork, while in lot 4, where the pigs weighed 61 pounds to begin with, only 4.23 pounds feed was required for the same increase. Of course it will be observed that in lot 2 the wheat was fed whole while it was ground in lot 4, the difference in the amounts of grain required, however (2.36 pounds), is much too great to be accounted for in this way.

A comparison of experiments 4 and 5 shows the value of skim-milk to be about one-seventh of the frozen wheat, pound for pound.

In comparing experiments 8 and 9, however, it will be seen that skim-milk is apparently worth one-fifth as much as the mixture of barley, rye, wheat and bran. This is explained by the smaller proportion of skim-milk in the ration. (See page ...)

Experiments 8 and 9 exemplify the importance of feeding a mixed ration as a means of economizing feed.

Experiment.	Feed.	How Prepared.	No. of Swine.	Average weight at start.	Average weight at finish.	Average net gain.	Number of days fed.	Average daily gain.	Average amount feed eaten.	Average amount feed for 1 lb. gain.	Per cent dressed weight.
				lbs.	lbs.	lbs.		lbs.	lbs.	lbs.	p.c.
1	Oats... Skim-milk.	Whole, soaked 54 hrs.	4	97	170	73	84	.87	307 252	4.21 3.45	74.67
2	Oats... Skim-milk.	Ground, soaked 54 hrs.	4	54	184	130	126	1.03	424 756	3.28 5.81	74.87
3	Barley	Ground, soaked 54 hrs.	4	73	184	111	112	1.00	483	4.35	74.56
4	Barley... Skim-milk.	Whole, soaked 54 hrs.	4	59	199	100	84	1.19	364 252	3.64 2.52	74.19
5	Corn	Ground, soaked 30 hrs.	4	74	172	98	112	.87	408	4.16	76.89
6	Corn	Whole, soaked 54 hrs.	3	72	190	118	91	1.30	343 273	2.90 2.81	81.74
7	Pease... Skim-milk.	Whole, soaked 54 hrs.	4	100	207	107	84	1.27	356 252	3.33 2.35	75.43
8	Pease... Skim-milk.	Ground, soaked 54 hrs.	4	62	224	162	126	1.28	446 756	2.76 4.68	76.07
9	Oats and pease... Skim-milk.	Ground, soaked 54 hrs.	3	61	226	165	126	1.31	503 756	3.00 4.51	75.15
10	Oats, barley and pease... Skim-milk.	Whole, soaked 54 hrs.	3	71	176	105	91	1.15	306 273	3.20 2.60	79.08
11	Shorts	Soaked 36 hrs.	4	72	156	84	112	.75	372	4.42	77.73
12	Meal... Skim-milk.	Soaked 30 hrs.	5	60	175	115	84	1.37	319 504	3.10 4.33	77.79
13	Meal... Skim-milk. Sunflowers	Soaked 30 hrs. Soaked.	5	61	154	93	84	1.11	179 504 197	1.92 5.40 2.11	74.40
14	Potatoes Meal... Skim-milk.	Raw Soaked 30 hrs.	3	56	153	97	140	.70	133 365 105	1.37 3.72 1.08	76.58
15	Potatoes Meal... Skim-milk.	Cooked. Soaked 30 hrs.	3	56	171	115	140	.82	831 177 315	7.18 1.52 2.72	
16	Potatoes Meal... Skim-milk.	Raw Cooked. Soaked 30 hrs.	3	55	192	137	140	.98	98 332 314 210	.71 2.41 2.28 1.52	76.99
17	Potatoes Meal... Skim-milk.	Cooked.	3	55	195	140	140	1.00	712 289 105	5.06 2.05 .71	
18	Potatoes Meal... Skim-milk.	Cooked.	3	50	192	142	140	1.01	1,034 140 420	7.29 .98 2.96	78.39
19	Oats, pease and barley.	Ground, soaked 30 hrs.	4	96	190	124	119	1.04	467	3.76	
20	3/4 Oats, pease and barley, 1/4 clover.	Ground and soaked.	4	68	137	69	119	.58	247	3.60	
									82	1.20	

Meal in each case in the above tables means a mixture, equal parts by weight, of barley, rye, frozen wheat and bran, the first three being ground.
of barley, rye, frozen wheat and bran, the first three being ground.

GREEN FEEDS AND PASTURES.

EXPERIMENTS WITH RAPE.

A great many pigs are fed annually on rape on the Experimental Farm at Ottawa. The following record is submitted to illustrate the part taken by rape in pork production. In one instance six pigs were pastured from August 14 till snow in 1900 on three-sixteenths of an acre of rape.

LOT OF SIX PIGS ON RAPE PASTURE.

TABLE XXVII.

No. of Pig.	WEIGHTS.							
	Aug. 14.	Aug. 28.	Sept. 11.	Sept. 25.	Oct. 9.	Oct. 16.	Oct. 30.	Dec. 6.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
279.....	61	76	80	85	96	108	129	175
280.....	60	73	80	85	105	121	147	195
281.....	64	73	91	103	111	127	150	201
282.....	60	73	90	99	109	120	143	171
283.....	60	72	82	90	114	135	157	203
284.....	53	68	76	90	105	118	141	182
Total.....	358	435	499	571	640	729	867	1,127
Total gain.....		87	64	72	69	89	138	260
Daily rate of gain in lbs.....		1.03	0.76	0.85	0.82	1.12	1.64	1.20
Daily grain ration.....		1	1½	1½	2	3	4	5

During the latter part of November and December the pigs had no rape.

A study of the above table shows that to produce 100 pounds of pork only 269 pounds of meal was required in addition to the rape. The average amount of meal required for 100 pounds of pork is 425 pounds. The use of rape, therefore, saved 156 pounds of meal, saved by three-sixteenths of an acre of rape. All pig weights mentioned are live weights.

Many other lots have been fed similarly with similar results. In 1902 sixty pigs were fed on an acre and a half. In addition to the rape pasture, about 500 pounds of meal were required for each pig from weaning time to an average of 185 pounds live weight in October or November.

THE JERUSALEM ARTICHOKE.

(*Helianthus tuberosus*.)

A plant that is attracting some attention as yielding a plentiful supply of succulent and apparently rather nutritious food for pigs is the Jerusalem Artichoke. Its value would, however, appear to be lessened by the great length of time required to mature the tubers or even produce them in any considerable bulk at the base of a plant.

A plot of one-sixteenth of an acre (10 square rods) in area was sown May 19, with about 70 pounds of tubers. They were planted four inches deep, in rows 24 inches

apart, and in hills about 20 inches apart in the rows. They required but little cultivation, as they soon grew so dense as to kill all other or less vigorous forms of plant life. The growth of the plant for about three months was confined to the stem, leaves and roots alone, no appreciable development of tubers being observable. In September young tubers made their appearance and slowly developed.

On October 3 only small tubers about the size of a hen's eggs were found on digging, although the plants had made a most luxuriant growth, standing 10 to 13 feet high, and about 50 per cent of them being in flower.

Although the tubers were immature, it was decided, in view of the lateness of the date, to turn the pigs in at once. Accordingly on the above-mentioned date six cross-bred pigs were turned free in the lot. They were allowed 1½ pounds of meal each per diem in addition to the artichokes, which they rooted out most industriously and ate most greedily. I have never seen pigs eat anything with more gusto.

The following table will give an idea of the progress made by this lot of pigs while on artichokes as a supplementary food for pigs:—

TABLE XXVIII.

No. of Pig.	Weight, Oct. 3.	Weight, Oct. 24.	Gain.	Daily rate of Gain.	No. of Pig.	Weight, Oct. 3.	Weight, Oct. 24.	Gain.	Daily rate of Gain.
	Lbs.	Lbs.	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	Lbs.
263.....	100	131	31	1.47	269.....	109	145	36	1.71
264.....	105	141	36	1.71	271.....	95	127	32	1.52
267.....	106	138	32	1.52					
268.....	111	141	30	1.42	Total.....	626	823	197	1.57
									Average

The daily average of 1.57 pounds is remarkable in pigs of such live weights, but becomes still more worthy of consideration when we remember the small amount of grain fed per diem.

During the twenty one days the 6 pigs consumed 189 pounds of meal (one-half corn, one-half oats, pease and barley equal parts), at 90 cents per cwt., \$1.70, while the meat produced, valued at current prices (\$6.25 per cwt.), was worth \$12.31, leaving a balance of \$10.61 for the sixteenth of an acre of artichokes. Putting this in another way, we have 197 pounds of pork produced at a cost as follows:—

189 pounds meal at 90 cents.....	\$1 70
One-sixteenth acre artichokes, cost for seed.....	\$0 50
For planting, &c.....	1 00
Rent, \$5 per acre.....	0 25
	1 85
Net cost.....	\$2 25

That is, one pound of pork produced at a cost of 1.8 cents.

This tuber may be sown in the autumn, and will then start to grow early the next year, or the crop may be left unharvested till the ensuing spring, and pigs allowed to root them out as soon as the frost comes out.

EXPERIMENTS WITH ROOTS.

In each case the meal mixture fed consisted of one-half corn, the other half oats, pease and barley, equal parts. In addition, each pig was given three pounds of milk daily, and all the roots they would consume, as follows:—

Lot 1.—Turnips fed pulped.

Lot 2.—Mangels fed pulped.

Lot 3.—Sugar beets grown for forage fed pulped.

Lot 4.—Sugar beets grown for sugar production fed pulped.

LOT 1—MEAL, MILK, TURNIPS.

Number of pigs in test.....	4
Aggregate weight, January 7.....	405 lbs.
Average weight, January 7.....	101 "
Aggregate weight April 23.....	768 "
Average weight April 23.....	192 "
Aggregate gain.....	363 "
Average gain.....	91 "
Daily rate of gain per pig for 106 days.....	.85 "
Pigs ate 780 lbs. meal at 90 cents per cwt.....	\$ 7 02
" ate 3,808 lbs. mangels at 10 cents per cwt.....	3 81
" ate 1,284 lbs. skim milk at 20 cents per cwt.....	2 57

Total.....\$13 40

Cost to produce pork was:—

405 lbs. feeders at \$7 per cwt.....	\$28 35
Food consumed, value.....	13 40

Total cost.....\$41 75

Sold 768 lbs. pork at \$6 per cwt.....	\$46 08
Profit on lot of 4 pigs.....	4 33
Cost to produce 100 lbs. increase live weight.....	3 69

Buyer's report:—

4 pigs—all 'select.'

Packer's report on carc.

No. 312, weighed alive, 197 lbs.; dressed, 133 lbs.; graded; good; firm.
No. 313, weighed alive, 197 lbs.; dressed, 135 lbs.; graded; hard; firm.
No. 314, weighed alive, 189 lbs.; dressed, 126 lbs.; graded; hard; firm.
No. 315, weighed alive, 185 lbs.; dressed, 121 lbs.; graded; good; firm.

LOT 2—MEAL, MILK, MANGLES.

Number of pigs in test.....	4
Aggregate weight January 7.....	377 lbs.
Average weight January 7.....	94 "
Aggregate weight April 23.....	766 "
Average weight April 23.....	191 "
Aggregate gain.....	389 "
Average gain.....	97 "
Daily rate of gain per pig.....	.90 "
Pigs ate 786 lbs. meal at 90 cents per cwt.....	\$7 07
" ate 5,930 lbs. mangels at 10 cents per cwt.....	5 93
" ate 1,284 lbs. skim milk at 20 cents per cwt.....	2 07

Total.....\$15 57

Cost to produce pork was:—

377 lbs. feeders at \$7 per cwt.....	\$26 39
Food consumed.....	15 57

Total cost.....
\$41 96

Sold 766 lbs. pork at \$6 per cwt..... \$45 96

Profit on lot of 4 pigs..... 4 00

Cost to produce 100 lbs. increase live weight..... 4 00

Buyer's report:—

4 pigs—all 'select.'

Packer's report:—

No. 319, weighed alive, 195 lbs.; dressed, 135; graded; good; firm.

No. 317, weighed alive, 195; dressed, 138 lbs.; graded; good; firm.

No. 318, weighed alive, 182; dressed, 125 lbs.; graded; good; firm.

No. 319, weighed alive, 194 lbs.; dressed, 131; graded; good; firm.

LOT 3—MEAL, MILK, FORAGE, SUGAR BEETS.

Number of pigs in test.....	4
Aggregate weight January 7.....	307 lbs.
Average weight January 7.....	77 "
Aggregate weight April 23.....	507 "
Average weight April 23.....	202 "
Aggregate gain.....	500 "
Average gain.....	125 "
Daily rate of gain per pig, 106 days.....	1.18 "
Pigs ate 793 lbs. meal at 90 cents a cwt.....	\$ 7 13
" ate 4,298 lbs. sugar beets at 15 cents per cwt.....	6 44
" ate 1,284 lbs. skim milk at 7 cents per cwt.....	2 57
Total.....	\$16 14

Cost to produce pork was:—

307 lbs. feeders at \$7 per cwt.....	\$21 49
Food consumed.....	16 14

Total cost.....
\$37 63

Sold 807 lbs. pork at \$6 per cwt..... \$48 42

Profit on lot of 4 pigs..... 16 79

Cost to produce 100 lbs. increase live weight..... 3 22

Buyer's report:—

3 pigs, 'select,' 1 'fat.'

Packer's report:—

No. 320, weighed alive, 175 lbs.; dressed, 115 lbs.; graded; medium; a little too thin.

No. 321, weighed alive, 218 lbs.; dressed, 155 lbs.; graded; very good; a little too fat.

No. 322, weighed alive, 167 lbs.; dressed, 155 lbs.; graded; very fair

No. 323, weighed alive, 287 lbs.; dressed, 157 lbs.; graded; very firm; right thickness of fat.

LOT 4—MEAL, MILK, SUGAR BEETS—(*Special Culture*).

Number of pigs tested.....	4
Aggregate weight January 1.....	228 lbs.
Average weight January 7.....	57 "
Aggregate weight May 25.....	754 "
Average weight May 25.....	188 "
Aggregate gain.....	528 "
Average gain.....	132 "
Daily rate of gain per pig for 138 days.....	.95 "
Pigs ate 1,030 lbs. meal at 90 cents per cwt.....	\$ 9 27
" ate 4,266 lbs. sugar beets at 15 cents per cwt.....	6 39
" ate 1,680 lbs. skim milk at 20 cents per cwt.....	3 36
Total.....	\$19 02
Cost to produce pork was.—	
228 lbs. feeders ate \$7 per cwt.....	\$15 96
Food consumed.....	19 02
Total cost.....	\$34 98
Sold 754 lbs. pork at \$6 per cwt.....	\$45 24
Profit on lot of 4 pigs.....	10 26
Cost to produce 100 lbs. increase live weight.....	3 60

Buyer's report:—

4 pigs all 'select.'

No packer's report on carcasses.

BROME GRASS PASTURE FOR PIGS.

In 1900, Mr. S. A. Bedford, at Brandon, fed Chester Tamworths cross pigs on brome grass pasture.

The pasture field was seeded to brome grass in August, 1898. The area was one acre, and it not only gave abundance of pasture for the four pigs, but about two tons of hay was saved in addition. The pigs were evidently very fond of the grass, and were found feeding on it at all times of the day.

For the first three months both lots were fed on a mixture of soaked ground grain, composed of half oats, quarter barley and quarter wheat screenings, and during the last three months on ground peas alone.

The penned animals were fed all the grain they would eat up clean, but the pastured pigs only received sufficient to keep them steadily gaining in flesh without making them independent of the pasture.

Cost of Grain Fed to Pigs in Pasture.

156 pounds of barley at $\frac{1}{2}$ cent per pound.....	\$ 0 78
156 pounds of wheat screenings at $\frac{1}{2}$ cent per pound.....	0 78
312 pounds of oats at $\frac{3}{4}$ cents per pound.....	2 34
325 pounds of peas at 1 cent per pound.....	3 25
	\$ 7 15

Cost of Grain Fed to Pigs without Pasture.

231 pounds of barley at $\frac{1}{2}$ cent per pound.	\$ 1 15
231 pounds of wheat screenings at $\frac{1}{2}$ cent per pound.	1 15
462 pounds of oats at $\frac{3}{4}$ cents per pound.	3 46
425 pounds of peas at 1 cent per pound.	4 25
	\$10 01

SUMMARY.

Pastured pigs—

	Dr.	Cr.
First cost of pigs, 117 pounds at $4\frac{1}{2}$ cents.	\$ 5 26	
Cost of feed.	7 15	
Sold 510 pounds at $4\frac{1}{2}$ cents.		\$22 95
Profit on four pigs.	10 54	
	\$22 95	\$22 95

Without Pasture—

	Dr.	Cr.
First cost of pigs, 115 pounds at 4 cents.	\$ 5 17	
Cost of feed.	10 01	
Sold 481 pounds at $4\frac{1}{2}$ cents.		\$21 64
Profit on pigs.	6 46	
	\$21 64	\$21 64

POTATOES AND TURNIPS AS PIG FEED.

Experiment at Brandon, 1902.

Potatoes and turnips give large returns in this country, and if found profitable for pig feed, this quantity grown could be greatly increased.

Four pigs were used for this test—two pure-bred Yorkshires and two Yorkshire Tamworth crosses. In the test each pair consisted of one pure-bred and one cross-bred animal.

The grain mixture used was composed of one-half barley and one quarter each of oats and wheat screenings, valued at 75 cents per hundred pounds. With this was fed a mixture of two-thirds small potatoes and one-third turnips, which are valued at 20 cents per bushel. These were boiled, mashed and mixed with the ground grain.

It would appear from this test that potatoes and turnips can be used to replace a portion of the grain ration, but they are worth less than 20 cents per bushel for that purpose.

RATION fed during the fattening term of 82 days, from August 28 to November 18:—

TABLE XXIX.

	Grain fed.	Value.	Roots fed.	Value.	Total value of food.
	Lbs.	\$ cts.	Lbs.	\$ cts.	\$ cts.
Pen 1, fed roots	728	5 46	800	2 88	8 28
Pen 2, without roots	978	7 33			7 33

SUMMARY.

	Weight when bought.	Value when bought.	Weight when killed.	Value when killed.	Value of food.	Profit on each pair.
	Lbs.	\$ cts.	Lbs.	\$ cts.	\$ cts.	\$ cts.
Pen 1, fed roots	171	10 26	372	22 32	8 28	3 78
Pen 2, without roots	177	10 62	372	22 32	7 33	4 37

STOCK FOODS FOR PORK PRODUCTION.

In August, 1904, 32 pigs, ranging in weight from 43 to 80 pounds were divided into eight groups of four pigs each, and for the next 90 days fed experimentally. In each case the individuals in a group were nearly uniform in size. The groups, however, showed considerable difference in their total weights, the heaviest group weighing 300 pounds, or 75 pounds per pig, while the lightest group weighed 180 pounds, or 45 pounds per pig. It was not possible to secure a more uniform lot at the time, and it was considered better to have considerable difference in the total weights of the lots rather than to have some large and some small pigs in each lot.

The experiments lasted 90 days. During that time pigs were confined in pens with small floored yards attached. Lots 7 and 8, however, were outside, lot 7 having a small unfloored yard and a cabin wherein to sleep, while lot 8 had a clover pasture of about one-eighth of an acre and a cabin wherein to sleep.

The results speak for themselves, but it will be noticed that all supplementary foods fed other than skim-milk and pasture, had the effect of raising the cost of production. Skim-milk, on the contrary, lowered the cost very materially, and pasture had a similar effect in a lesser degree. The meal used was a mixture of half shorts and half mixed grains, oats, pease and barley.

In estimating the cost of production, the meal ration is valued at \$1 per 100 pounds, the skim-milk at 15 cents per 100 pounds, and the supplementary foods or stock foods at the cost of the same on the Ottawa markets, viz.: Anglo-Saxon stock food, 10 cents per pound; International stock food, 15 cents per pound; Herbageum 12½ cents per pound, and sugar and flax 2½ cents per pound. Pasture is not valued, but its value may be deduced from the data given.

TABLE XXX.
STOCK FOODS FOR PORK PRODUCTION.

Lot	1	2	3	4	5	6	7	8
Description of ration	Meal, Inside.	Meal, Anglo-Saxon Stock Food.	Meal, International Stock Food.	Meal, Sour skim-milk.	Meal, Herbageum.	Meal, Sugar and Flax.	Meal, Outside.	Meal, Pasture Clover and Rape.
No. of pigs	4	4	4	4	4	4	4	4
No. of days on feed	90	90	90	90	90	90	90	90
Total weight to start	300 lbs.	206 lbs.	298 lbs.	180 lbs.	220 lbs.	240 lbs.	204 lbs.	250 lbs.
Average weight to start	75 "	51½ "	52 "	45 "	55 "	60 "	51 "	62½ "
Total weight at end of experiment	725 "	665 "	541 "	612 "	673 "	711 "	657 "	683 "
Average weight at end of experiment	181¼ "	166¼ "	135¼ "	153 "	168 "	178 "	164 "	171 "
Amount of feed	1,860 "	1,551 "	1,496 "	1,273 "	1,781 "	1,880 "	1,942 "	1,741 "
Amount of other food	425 lbs.	80 "	42 "	1,335 "	45 "	322 "	453 lbs.	Pasture.
Total gain of lot in 90 days	128 "	209 "	333 "	432 "	453 "	471 "	431 "	413 lbs.
Amount of meat required for 100 lbs. gain	128 "	432 "	437 "	295 "	393 "	369 "	431 "	421 "
Cost of 100 lbs. gain	84.38 "	22 "	12 "	309 "	10 "	68 "	84.31 "	Pasture.
Daily rate of gain per pig	1.71 lbs.	86.52 "	86.17 "	83.42 "	85.15 "	85.69 "	84.31 "	84.21 "
Total gain per pig in 90 days	106½ "	100 lbs.	925 lbs.	1,20 lbs.	1,25 lbs.	1,31 lbs.	1,25 lbs.	1,15 lbs.
			83½ "	108 "	113½ "	117½ "	113½ "	109½ "

The Anglo-Saxon Stock Food, the International Stock Food and Herbageum were all fed according to manufacturers' directions both as to quantity to feed and method of feeding.